# ELECTRICAL REVIEW

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

(Formerly Review of Telegraph and Telephone.)

Vol. 2, No. 10. WEEKLY. NEW YORK, THURSDAY, MAY 10, 1883. $3 per Annum. Single Copies, 10 Cents.


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Entered at Post Office, New York, as Mail Matter of the Second Class.

## The Providence Telephone Company.

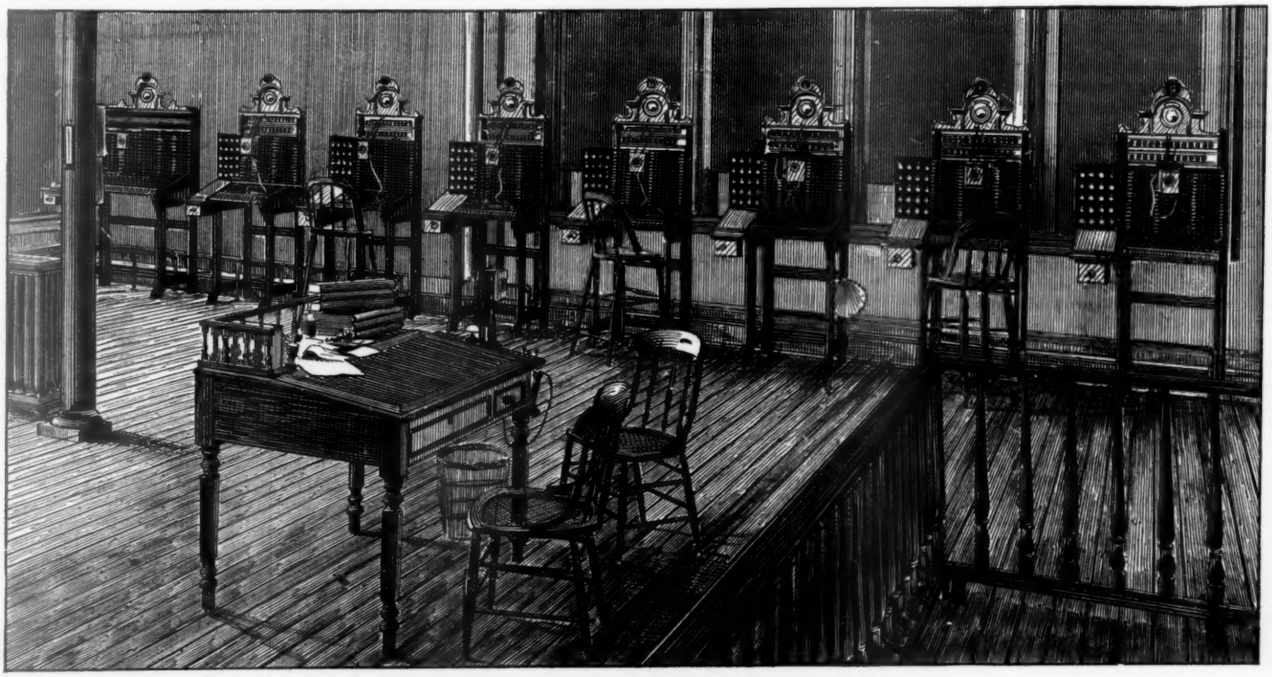
WHAT EFFICIENT MANAGEMENT HAS ACCOMPLISHED IN THREE YEARS.

The operating-room of the Providence Telephone Exchange, one side of which we illustrate herewith, was referred to briefly some time since in these columns, but on account of the excellent manner of its construction, and the general management of the business, which has been so remarkably successful, we have thought it important and interesting to our readers to illustrate the description given so fully in our issue to-day.

The rapid growth of the telephone business in the territory of the Providence Telephone Company is shown by the following statement of the number of telephones in use at their various exchanges in the several years which have elapsed since the organization of the present company:

| | Providence. | Total in all exchanges of the county. |
|---|---|---|
| Number of telephones rented Aug. 2, 1880.... | 641 | 802 |
| Number of telephones rented Jan. 1, 1881.... | 857 | 1,072 |
| Number of telephones rented Jan. 1, 1882.. | 1,063 | 1,541 |
| Number of telephones rented Jan. 1, 1883... | 1,432 | 2,136 |
| Number of telephones rented April 1, 1883... | 1,725 | 2,480 |

The increase of the present year bids fair to continue at the rate of about one hundred per month. The exchanges operated by the Providence company are located as follows: The principal office in Providence City, in which about sixteen hundred subscribers are connected directly with this one room; one branch office in Olneyville, some two miles in the suburbs, where about one hundred residences are connected; Pawtucket, Woonsocket, Attleboro, North Attleboro, Warren, Bristol, Pascoag,, and Westerly. The territory within fifteen miles of Providence, which includes all of the above-mentioned places, with the exception of Pascoag and Westerly, is considered as a part of the regular Providence exchange, the offices being worked as branch offices, and no extra-territorial charges made for communication between any of them. As Providence is the business center of this locality, of course the work upon the trunk lines is very large, in some of the offices exceeding the local communications; and the number of communications in the Providence office alone average about nine thousand a day.



OPERATING ROOM, PROVIDENCE TELEPHONE EXCHANGE. (VIEW OF ONE SIDE ONLY.)

The operating-room of the Providence main office was enlarged and refitted in the summer of '81, and an entirely novel system of making connections between the switch-boards adopted, the peculiar features of which are throwing a portion of the work upon the subscribers by, in most cases, obliging them to give their order twice, doing away with all communication between operators or the necessity of message boys around the room; which system has worked very satisfactorily, as may be judged from the fact that it has not been found necessary to modify it in any way with an increase of the number of subscribers from nine hundred, the number at the time the system was adopted, to about seventeen hundred in the same room, which is the number at the present day.

Other novel appliances have been added from time to time, as experience has found them desirable, in the main and branch offices. One important peculiarity is that the central-office telephones are invariably looped into the lines under all circumstances, so that no interference is given to the parties conversing if the central office connects into the circuit for any purpose whatever. In the rapid increase of long-distance telephoning, this is a very essential feature, and one which will undoubtedly be found indispensable in every large telephone exchange.

Young ladies are employed in the operating rooms, which are provided with many novelties contributing to the comfort of the operators, and speed in making connections from switch to switch. A retiring-room, to be used during meal hours, &c., for the ladies, leads from the operating-room of the main office, which is furnished elegantly, and adorned with fine pictures and flowers, while upon the tables are found the best periodicals of the day as soon as they are issued. In fact every endeavor has been made to render the machinery of the operating department first-class, and, while holding the operators to a strict performance of their duties, to aid them in all ways which may tend to their comfort and good-nature.

The company have about two thousand miles of line in operation, and a number of cables of thirty to fifty wires each, all constructed in the most thorough manner, and are constantly adding to the property in this direction, particularly in the use of cables to extend from the central offices within a quarter of a mile. No movement has been made yet in the direction of underground lines, although there has been considerable discussion made both in the city and State governments on the subject. The lines entering the exchanges are of all descriptions known to telephone people,—special wires, two party wires, four party, bi-polar, Bliss clock lines, currier individual bells, and a few battery lines. A good evidence of the advantage of the system in vogue in this exchange is the fact that these various classes of lines are worked together in harmony, and to the satisfaction of subscribers. Connections average about a half a minute in regular work, and complaints of the service are very few, the most of them resulting from disarrangement of the instruments of the subscribers.

The original capital stock of this company was $75,000, which has been increased to $150,000, as required for the development of the business. Par value $50 per share; but few transfers have been made, the price having steadily advanced from $70 in 1881 to over $200 per share, where it now stands firm. Most of the stock is held in Providence, and the president and board of directors are prominent business men of Providence and vicinity.

We attribute the great success attained by this company to the energetic and able management of its general superintendent, Mr. Duxbury, and his assistants Messrs. Gardiner and White, who are too well known as old-time telegraphers and electricians to need any praise at our hands.

The officers of the company and board of directors we give herewith: Hon. Henry

Howard, president; Henry C. Cranston, vice-president; Charles T. Howard, secretary and treasurer; J. W. Duxbury, general superintendent; F. H. Gardiner, A. C. White, assistant superintendents; Henry Howard, Henry G. Russel, Henry C. Cranston, R. G. Hazard, 2d, Charles Bradley, R. M. Larned, James H. Chace, H. F. Barrows, C. R. Greene, William H. Pope, directors.

### The Ball Electric Light Company.

The following information is taken from the Reading, Pa., *Eagle*, of 1st inst., which after giving extracts from our recent article on the Ball Unipolar Dynamo Electric Machine, says:

"We learn from H. W. Spang, of this city, who has an interest in Mr. Ball's electric inventions, that the Unipolar Dynamo Electric Machine is being reduced to its best and simplest form as rapidly as possible, and it may be completed in about two or three months, when it will be in such a state of efficiency and perfection, that as far as the production of electricity by means of a rotating armature is concerned, there will be scarcely anything left for other inventors to improve upon.

"He also stated that the Unipolar Generator has not only effected a reduction in the power required to produce electricity, but also that it produces a current of greater energy, which is able to operate substantial and steady moving lamp mechanism and consume all the carbon of arc lamps, thereby giving a very steady and vivid light, and preventing the formation of buttons and tackheads at the arcs, which is quite a common occurrence with the current from the other machines.

"The crater in the upper carbon of a Ball arc lamp is usually about twice the diameter and depth of that formed by the current of other generators.

"The current from the Unipolar Generator bears about the same relation to that from a bipolar or multipolar generator, as a high grade oil, which has all the elements for giving a live and vivid light, does to a medium or low grade oil.

"The armature of the latest improved unipolar machine will be able to make as high as 3,500 revolutions per minute without overheating the wire bobbins and core thereof, or bursting the parts asunder. While the armatures of nearly all other electric generators will overheat at about 1,000 revolutions per minute, notwithstanding all the ventilating, cooling and blowing devices employed in connection therewith.

"This high limit of speed without overheating is a very important feature, as it enables the unipolar machine to operate the maximum number of lamps or motors upon an out-door circuit during wet or damp weather, when there is considerable escape of electricity from the line, as well as during dry weather. It will also give good lights in a machine shop or manufactory where the power applied to it is also used for driving the shop machinery and is, as a rule, irregular. In a competitive test, the unipolar machine can easily send the light of its arc lamps through the light produced by its bipolar or multipolar competitor, as was demonstrated at the late Toronto exhibition. Mr. Spang claims that without the employment of a proper electric generator, no combined system of electric lighting, motive power or storage can be made a complete success, and he is confident that most of the dynamo electric generators, arc lamps, &c., now in use, will eventually be discarded.

"The Ball Electric Light Company will be organized in a month or two, and will, no doubt, have its main office in New York.

"It will be composed of capitalists of considerable influence and experience in electrical and other matters and promises to be a very strong corporation.

"It is proposed to use the buildings Nos. 622 and 624 Court street, and also part of the property recently purchased by Mr. Spang, on 7th street, between Court and Washington streets, in this city, for the manufacture of a portion of the electrical inventions, which will be controlled by the said company."

### Electric Lights.

Old things are passing away, all things are becoming new. Forty years ago brass candlesticks and sperm candles were the fashion; sperm oil of a very costly description was burned in huge "astral lamps," and "tallow dips" were the resource of the unenlightened multitude. The use of lard oil then came into vogue and by its superior abundance and cheapness created quite a revolution in the light and lamp business, while star and adamantine candles soon drove wax and sperm into aristocratic corners. And thus, the business of illumination continued until the discovery of the mineral oil turned everything in the line topsy-turvy and introduced a prodigious factor into the sum of trade. A lively fight was kept up for years, however, by the old line, until the process of refinery became so perfect that all general competition was precluded. But petroleum itself was in time compelled to share honors with a younger scion of its own family in the olefiant gas which, produced from coal, has become the favorite and most widely used means of illumination in the civilized world. Still, the oil business is an immense one, as it is used far more generally in private than gas, necessarily so in the country and largely so in the cities. But all public illuminations and all buildings of a large scope demand the use of gas, and the supply has grown up into a business of colossal proportions. The extraordinary brilliance, convenience and even economy of gas for light, would have reasonably created the impression that the ultimatum had been reached, henceforth *ne plus ultra!* But to the intense chagrin of those gentlemen who have large investments in gas stock and to the entire satisfaction of the people at large, and the advocates of progress, the discovery of the illuminating power of electricity and the many ingenious and successful applications of the same to domestic and public use have been something like a broadside delivered into the ribs of the gas frigate, and her colors are already trembling at the fore.

Doubtless years will elapse before the era of gas will be passed over and left behind. So with the use of petroleum oils. Perhaps neither will ever go into entire disuse. Like the wax, the sperm, the adamantine candle and the tallow dip, they will retain their reduced but respectable hold and will be utilized as the moon and the stars in conjunction with the sun. But a blind man may now see that the era of electrical lights has flashed upon the earth. That grand principle, so long recognized, studied and experimented upon, but so little understood, has been persuaded to throw off a scintillation of its quality, and the result is that man's eye is dazzled and his indomitable will has been set in motion to reduce this seraphic messenger of electricity to his own use as a genuine "slave of the lamb." The illuminating power of the electric lights is amazing. It is as far ahead of the gaslight as gaslight is ahead of the tallow candle! We believe we state the proportionate illuminating power of electricity to gas by the ratio of 21 to 1. This is simply prodigious, and the fact should always be borne in mind when the advocates of gas-light (as the other day in the Houston City Council) endeavor to prove that gas is cheaper than electricity—light for light, as it were! But what kind of comparison is this? Of course it is cheaper to buy a pig or a donkey than a fine horse, but if one wishes to ride conveniently, swiftly and comfortably, he will rather pay his $150 for a good horse than $10 for a donkey. We do not intend to disparage or cast contempt on gas, its works, its qualities, its trade, its utility or its advocates. By no means. It is an excellent thing, and will not be extirpated even by electricity; but the superior power, cheapness and simplicity of electric lights are patent, palpable, not to be disputed. Even the few electric lights scattered though our city have already done it a world of good. Outsiders talk of them, and as they scarcely go beyond their range, think that Houston is revolutionized. —*Houston Daily Post.*

### The Displacements and Deformations of Sparks by Electrostatic Action.

By M. Aug. Righi.

Well-known experiments show that the electric discharge begins when the electric density at the electrodes has a sufficient value in proportion to the diameter of the balls, their nature, distances, etc. If we admit that the discharge is constituted by the emission of electrified particles, it should begin upon that one of the two electrodes where the density is the greater, whence follows the explanation of many phenomena.

If we suppose that at a little distance from the place where the spark is formed there are other electrified bodies, the particles ought to deviate from their track, and diverge from bodies charged with the same electricity, and approximate to bodies charged with the contrary kind. The spark must follow the path of the first particles repelled, for, in virtue of the heat evolved, it offers the least resistance. The spark itself ought then to be deflected as if it were a body charged with electricity of the same kind as that of the electrode where the density prior to the discharge is greatest.

One of the methods in which I have verified facts of this kind is the following: We arrange perpendicularly, the one under the other, the two rods supporting the discharging-balls, and at an equal distance the two parallel vertical plates, kept always charged, the one + and the other —, by a Holtz machine with auxiliary combs, the exciters of which are sufficiently far from each other that the sparks cannot strike. We observe easily that when the two plates are not charged the spark produced between the two stems by the discharge of a condenser (charged by another Holtz machine) is almost a vertical right line, if the balls are not too far distant. But if the plates are charged, and if the balls are not identical in all respects, the spark becomes curved, approaching one of the other plate. These changes of shape are very remarkable if we insert in the circuit of discharge a resistance such that the spark becomes yellow. It acquires then very curious forms, and at the same time it is observed to set out from lateral parts of the electrodes.

Let us suppose, for instance, that the two balls are identical in dimensions and nature, but that one of them, the negative, communicates with the ground. The density is then greater upon the positive ball, and the discharge must begin there. The spark is, in fact, displaced and distorted, as if it were a flexible body positively electrified. The same effect is obtained if both balls are isolated, but the diameter of the negative is greater than that of the positive.

### Tones Produced by Intermittent Radiation.

W. C. Röntgen was induced by Bell's experiments with the photophone to employ an apparatus which he had long used in his physical lectures for showing the effect of intermittent radiation in gases. He used the lime light as a source of heat. The rays were concentrated by lenses upon a notched disk of pasteboard, which could be rapidly rotated about a horizontal axis. An absorption apparatus was placed behind the notches, with a short glass tube of one centimeter diameter, over which was placed a wide caoutchouc tube that led to the ear of the observer. The rays penetrated into the absorption apparatus when openings in the disk came in front of the rock salt plate, and were interrupted by the unnotched parts of the disk. With air, hydrogen or oxygen he was unable to obtain any tones; but with illuminating gas and with ammonia distinct tones were heard, somewhat like the whistling of a moderate wind. The pitch varied with the velocity of rotation, and the tone vanished only when the rotation became very rapid.

Mr. F. Stolba proposes to substitute graphite for sand in the ordinary laboratory bath. Graphite does not scratch glass vessels and is much more readily heated.

### Iridium Plating.

Mr. W. L. Dudley has announced before the Ohio Mechanics' Institute that the problem of electro-plating with iridium has been solved by employing a suitable solution of the metal and properly regulating the electric current. The solution is kept at uniform strength by using a plate of iridium as the anode. The metal is deposited in the reguline state, and takes a good polish. A buffing wheel that will grind off nickel plating in a few moments only serves to polish the iridium. Thin platinum foil, coated with iridium, retains its flexibility, and if the coating is not too thick, it will not readily scale off.

### A Swiss Electric Railway.

It is proposed to build an electric railway between Saint-Moritz-les-Bains and Portresina in Switzerland. The length will be 7,200 metres—4½ miles.

Previous to the opening of the St. Gothard tunnel the traffic between Switzerland and Italy passed by Coire and Chiavenna, across the Col du Jubier or the Col du Splugen. The railway on the Swiss side terminates at Coire, and during the next year the Italian system will be completed as far as Chiavenna. The projected electric railway will serve to connect Coire to Chiavenna by two routes. The distance from Coire to St. Moritz is 76.5 kilometers, and from St. Moritz to Chiavenna 48.8 kilometers, or 125 kilometers in all.

It is only proposed to erect a short portion at first, and if successful to extend it, as there is ample water power in the district.

### Photographing by Electric Light.

For the past two months Mr. T. M. Schleier and Mr T. P. Keck, Superintendent of the Brush Electric Light and Power Company, of Nashville, Tenn., have been endeavoring to invent some method by which photographs might be taken by using a less amount of light and give the same results as are obtained by Mr. Kurtz and others, who use from ten to twenty thousand candle-power. They claim to have been entirely successful. As you enter the gallery may be seen a parabolic reflector of about six feet in diameter, which is painted white on the inner side, and has two vertical rods attached to the upper side and two to the lower, which are adjustable, so as to enable the operator to use either one or two arcs, or dispense with both by making the carbon points unite.

There is also a cut-out, which is placed on a small shelf attached to the wall, and cuts the reflector out of the circuit whenever the arcs becomes too long, due to some negligence of the operator.

An arc of 2,000-candle power is used for a single photograph, and 4,000-candle power for a group, either of which are taken in four or five seconds.

### Cable Across the Pacific.

The choice of routes of a Pacific cable is an important question that has never been satisfactorily settled. A line from Alaska to Japan would be much shorter than any other, and as the resistance experienced in working a cable is in proportion to its length, this is an important consideration. Unless recent advances have entirely removed former obstacles, a direct line from San Francisco to Yokohama or Japan, without intermediate landing-place, could not be worked with profit. As to any obstacles that might arise frem carrying the line into such a high latitude as Sitka, we judge that they cannot be serious, since only a few years ago it was proposed on good scientific authority to construct a line from Europe to the United States, *via* Iceland and Greenland, in order to avoid the difficulties encountered in direct connection across the Atlantic. Some of the Australian colonies had enterprise enough to offer subsidies for the laying of duplicate cables on several routes; but as subsidy is a tabooed word in the United States, we can only trust it will be made apparent that the enterprise would be sufficiently profitable without Government aid.

### Armington & Sims Engine for Electric Light Purposes.

The Armington & Sims engine, which we illustrate to-day, has been found to be particularly well adapted to the purpose for which power is required in electric lighting. The recent severe tests to which we referred to a short time since, proved their durability and safety when run under the very highest rate of speed needed for driving dynamos; this and other equally successful experiments to which we shall refer, has drawn considerable attention from electric light people.

The 14½x13 in. engine, now in use at Edison's central station in Pearl street, has a regulation speed of 350 revolutions per minute, and it was recently determined by Mr. Edison himself to try one of these engines and see what there was in it. The particular engine had no special preparation, but was started, and once being started ran for sixteen days, 17½ hours actual time, at its full speed of 350 revolutions per minute, making 8,431,500 revolutions. To give a better idea of what this immense number of revolutions means, had the same engine been attached to a locomotive with a six-foot driving wheel, and been run at the same speed for the same length of time without stoppage, it would have made 30,100.45 miles. In other words, it would have traversed the circumference of the earth and one-fifth the second distance. The engine was stopped from the disarrangement of a wire connected on the dynamo. The engine was then carefully examined and was found to be in absolutely first-class condition, no readjustment was required, the oil-cups were turned down to stop feeding, the engine was cleaned, and when night come on was started again for thirteen hours' work. Mr. Edison himself likes to make these tests, so as to be sure that the engine when sent out, should anything occur, will not be at fault, and he could probably tell some curious instances where experts have smashed up and disarranged an engine by attempting to do something for which the engine was never made.

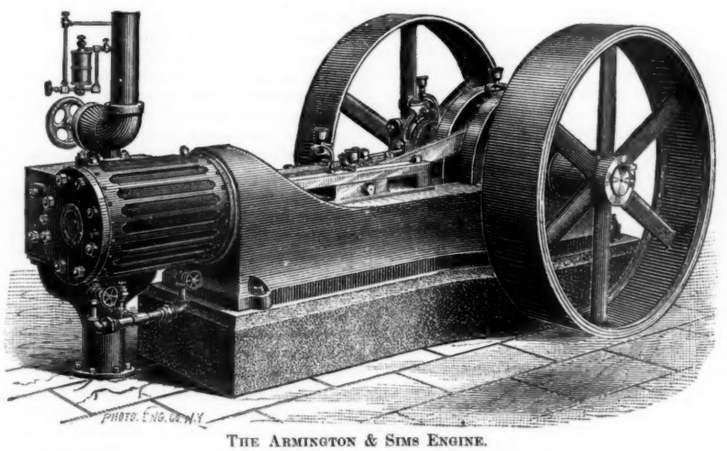
We have had a great deal of interest in watching the Armington & Sims engine, and we are pleased to be able to give the above data directly from one of the attachés of the Edison Company that it is a positive performance, that the engine all these days was in charge of the regular engineer, and that no experts or graduates had anything to do with it, or in the manipulation of the figures. It was in charge of sensible men who are hired and paid to make the best thing they can actually, and give the best account of themselves.

It is a matter of congratulation which our engine-builders should be proud of that this firm has already introduced a large number of these engines into use in London and Paris, and that their sales have recently so increased over there, that they have already built a shop in Paris to enable them to supply the European demand. Mr. Armington and Mr. David Cunningham have charge of the Paris shop, and are giving their entire attention to the building of engines of this pattern mainly for the electric light companies.

### To Estimate the Power of a Stream.

To measure water roughly in an open stream, take from four to twelve different points in a straight line across the stream, and measure the depth at each of these points, and adding them together, divide by the number of measurements taken. This quotient will give you the average depth, which should be measured in feet Multiply this average depth in feet by the width in feet, and this will give you the square feet of cross section of the stream. Multiply this by the velocity of the stream in feet per minute and you will have the cubic feet per minute of the stream. The velocity of the stream can be found by laying off one hundred feet on the bank, and then throwing a board into the stream at the middle, note the time passing over the one hundred feet, and dividing the one hundred feet by the time and multiplying by sixty gives the velocity in feet per minute at the surface. The velocity at the center is only eighty-three per cent. of that at the surface, and so only eighty-three per cent. should be calculated. For example, suppose the float passes one hundred feet in ten seconds, then divided by ten and multiplied by sixty (seconds in the minute) gives 600 feet per minute as the velocity, and eighty-three per cent. of this gives 498 feet per minute as the velocity of the stream at the center, and the area of the cross section multiplied by this will give you the number of cubic feet per minute in the stream. This, of course, is only a rough way of calculating, but it is often used, and is a good and simple way to obtain data to select a wheel by.

The distinguished feature in the approaching Amsterdam Exhibition will be the colonial section. For the first time in the history of these exhibitions will be seen classed in scientific order, group by group, specimens of the productions and resources of the entire colonial world. It will comprise examples of everything interesting in the natural history of the different colonies—their geology, mineralogy fauna, flora, anthropology, etc. A second category will comprehend a complete collection of objects illustrative of the civilization of the tribes and the peoples indigenous to the several colonies, their manners, customs, domestic economy, arms, dress, etc. A third group will consist of everything of use in colonial enterprise—the appliances of travel or exploration, the military equipments, manufactures, coinage, etc., of the European settlers. Holland is, next to England, the greatest colonial power in the world, ruling as she does over thirty-seven millions of aborigines. Her finest colonies are, of course, Sumatra, Java and Borneo.




The Armington & Sims Engine.

### The Brush Storage Battery.

In a recent interview Mr. Geo. W. Stockley, the Vice-President and Manager of the Brush Electric Company, said in speaking of the articles that have appeared in the newspapers concerning the lack of durability and small value of the storage batteries which the Brush company is said to be preparing to put upon the market, that within a few months the batteries would answer these charges conclusively.

In the meantime he should like to make the following authoritative statement from the Brush Company:

First. The Brush accumulator or secondary battery is a perfected invention, and not an experiment. It is entirely satisfactory to Mr. Brush and to our company, and we are erecting a new plant at great cost, requiring about 1,500-horse power solely for this branch of our business

Second. This battery is protected by patents granted to Mr. Brush and controlled by our company, and no patents belonging to any other parties are infringed by it.

Third. This battery will not depreciate in value or power more than five per cent. per annum. During the first year or so it will improve with use, and after that remain practically constant with very slight attention.

Fourth. For every horse-power absorbed by the dynamo machine used in charging the battery, the battery will deliver eight lights in Swan lamps equal to Edison's "A" lamps in power.

With this statement Mr. Stockley and the Brush Company propose to drop the subject, so far as competitors or criticism are concerned, and devote themselves to filling the orders for batteries which they are constantly receiving.

### A Proposition to Light the City of Hartford.

The *Hartford Courant* of the 1st inst. says that the Hartford Electric Light Company has submitted to the city authorities a plan to light the entire city, and the proposition, in official form, will be laid before the Council at its meeting two weeks hence.

It is proposed to place 100 electric lights in the central part of the city, on Main street, from Pleasant to the South Green, on Asylum street, from Main to the depot, and on State street. The City Hall square will be effectively lighted, and a light will be placed in the chamber of the Board of Aldermen, another in the Council Chamber, and another in the City Hall clock.

For the remainder of the city it is proposed to use a new style of naphtha lamps which give a stronger light than the ordinary street gas-lamp, that is, while the gas-lamp is a 3-foot burner, the naphtha lamp will be equal to a 5-foot burner.

The lamp-posts are the property of the city, and can be utilized for both the electric and the naphtha lights, the posts for the former to be increased in height, that the light may be shed over a greater area.

The company propose to furnish the lights every night in the year, moonlight or dark, and that they shall be kept burning all night. The figure named for the service is $38,000 per annum. The present cost of the gas service is $46,000, therefore a saving of $8,000 is effected, and the central portion of the city would certainly be more effectively lighted than now, and most probably the other portions also.

The company recognizes the possibility of doubt as to the capacity of the naphtha lamps and will exhibit specimen lamps here within a few days.

The strength of boilers, according to an engineering paper, is not much affected by the working temperatures up to considerably over 400°, nor by low temperature down to the freezing point. But when the temperature of the plates, through the absence of water or any other cause, rises about 500°, then a change commences. Above 750° the tenacity diminishes very rapidly, and when the plates become red hot they have lost fully half of their usual strength.

The cable-laying steamship Faraday is now at anchor in the North River, opposite Castle Garden. She attracts much attention by her peculiar construction and rig, being bow-shaped at both ends—in technical language, a double ender. From her stern a balcony juts out, on which the paying-out apparatus is placed, and on her bow there is a reeling apparatus suitable for picking-up purposes.

The Faraday is at present chartered by Henderson Brothers, of this city, and her three large tanks are used, when she is not employed in cable laying, for carrying grain in bulk, in which prosaic business she is now engaged.

### Some Serious Considerations Concerning a Governmental Telegraph.

(*Continued.*)

Colonel Price closes his address in a blaze of glory. "Life," he says, "is a warfare." This is a soldier's definition of life "Society," he adds, "is but the battalions wheeling about us." This savors somewhat of a military dancing-master's idea of society; but these are very good remarks, and the transition therefrom to the Franco-Prussian war is quite easy and natural. In war the Colonel is, of course, "on his native heath." Once fairly started on the war-path, it may readily be imagined that he and Germany handle poor France very roughly.

It appears that the German army had a very loud-sounding and deadly telegraph instrument—a sort of Governmental telegraph "ticker." The sound thereof, according to the Colonel, "was heard at the head of the division, of the regiment, and of the company, mingling with the rattle of musketry and the thunder of artillery—*more deadly than either.*"

The Germans set up this bloody "ticker" before the "ancient and mighty fortresses of the frontier," and they sank to rise no more. They set it up before Metz, and "Metz fell." It was a brave "ticker." "It sat undisturbed in the presence of the enemy and amid the smoke of the fray, while the carnage went on around. Its terrible hammer-stroke was dealing the blows that were crushing France."

"And nearer, clearer, deadlier than before," the sound of this terrible "ticker" was heard throughout France, and on every side there went up—in pure English, but with a slight French accent—the cry, "Arm! arm! it is—it is the ticker's opening roar!" The Germans finally planted the sanguinary ticker before Paris, and the result is thus described by Colonel Price: "Under the merciless click of the instrument, which was no less prompt and faithful in giving back the shouts of victory, the war ended—peace proclaimed!"

The Colonel assures us, on the authority of "eminent soldiers," that "the war could not have been conducted upon the scale of extent and rapidity that it was, without the telegraph as *controlled in Germany.*"

The Governmental telegraph seems really to have been a glorious thing for Germany; but then the French had a Governmental telegraph, too. It was not so glorious for France—in fact, it was a dismal failure. The Germans probably beat the French in the "tickers," both in loudness of tone and in deadliness of execution.

And now, Colonel, with Germany triumphant and with France lying bleeding at thy feet, we must leave thee.

Pray, take thy friend's advice. Wouldst thou become a great statistican? Study diligently the abstruse rules of addition and subtraction. Deal kindly with thy Creator, I beseech thee. Demand not in rude speech his secrets, either in battalions or in squads.

Overawe not Jehovah with thy military swagger, thou son of Mars!

He is patient and long-suffering and slow to anger; but he holds in his clinched hand the forked lightnings, and he wields with his Omnipotent arm the dread thunderbolts of heaven.

Drive him not to dire extremity, lest in his wrath he give us a Governmental telegraph, without the greatest of prospective statisticians—a telegraph to be maintained at the expense of the tax-payers, to be mismanaged by the politicians, and liable to be prostituted to the vile purposes of partisan politics.

It would require about 100,000,000 messages at ten cents each to yield a revenue equal to the amount of the expenses of the Western Union Telegraph Company in the year 1882, say $10,000,000. That company, with its present facilities, enormous as they are, cannot probably transmit, even by working twenty-four hours daily, more than 66,000,000 messages per annum. This, however, cannot be done without greatly increased expense. It would, therefore, have on file unsent, at the close of the first year of this experiment, say 34,000,000 messages. The last message filed would, if all things worked well, be transmitted about six months after its date. Consequently it would require about one year and six months to transmit the first year's business, or an amount of business sufficient to pay a portion of the expenses of that year. This service, yielding a revenue of $10,000,000, would cost $18,000,000.

The Colonel raises a doubt in one's mind by asserting positively that "the transmission of intelligence is a Governmental function." Assuming that the transmission of intelligence by post is peculiarly a function of the Government, it is proper to inquire whether or not the Government performs this function.

Everybody knows that the Government intrusts the transportation of the mails to individual enterprise—to railway, steamboat and stage companies. If the transmission of intelligence be a function peculiar to the Government, it is one which it performs in a peculiar way—it is a function which the Government performs by proxy.

The pursuit of a simple occupation by proxy is not likely to lead the Government to any great proficiency in that particular avocation, much less is it likely to qualify it for a complex business of an entirely different character.

The agents of the Government accept and stamp letters offered by the public, put them in mail-bags, and turn them over to others for transmission to distant points, there to be delivered to other agents, who in a few cities distribute the letters by messengers, but in most places simply hand them to those who call for them. Nothing is more simple than this routine. It requires no skilled labor or special training.

What business is more complex than telegraphy, with its interminable detail? It requires at every station at least one person with special training, and hundreds in some of the principal offices. It demands not only electrical experts and skilled operators to work the lines, but skilled workmen to construct and maintain them. It involves the purchase of enormous quantities of material of various kinds, and the construction, maintenance, and never-ending repair of a plant so prodigious in extent as to bewilder the mind of any one who essays to grasp it.

Would it be safe to turn the politicians into these "pastures new?" Had we not better wait for that civil service millnenium of which the Colonel speaks in glowing terms?

Although Colonel Price may justly lay claim to great eloquence, he relies mainly on his statistics to prove the superiority of Governmental to individual control of the telegraph business.

He selects the Postal Telegraph of Great Britain and the Western Union Telegraph Company of the United States as exemplars of the two systems. He "points with satisfaction to the trial of Governmental telegraphy in England." He "points with a generous enthusiasm" to the achievements of the British Government in the telegraphic field. It has furnished us, he says, "the mighty influence of a brilliant example." It has surpassed all individual enterprises. It has opened an enormous number of new offices. It has cheapened the rates. It has accommodated the public "in the largest measure of usefulness." "The question of efficiency seems always dominant, that of revenue never." This intended compliment will hardly be appreciated by our English friends, who have made constant and strenuous efforts to put the system ona paying basis.

When Colonel Price looks upon the Western Union Company, he sees nothing but "monopoly," "selfishness," "villainy," "Cyclopean plunder," and a capital of $80,000,000.

Mr. John Pender, M. P., who recently made quite an extended tour in this country, with the purpose of examining the Western Union Company's system, speaks of that company as follows:

"I have thought it desirable to refer to my visit to America and say something about the Western Union system, because it is a system which is, probably, in its efficiency, only to be compared with our own system in England, which is worked by the Government, with this difference: that, being worked as a private enterprise, and being stimulated more or less by competition, I think the Western Union have shown greater results during the last ten years than our system has under Government management. I think the science of electricity has received more encouragement and been more developed, and the reduction of rates has during that time also been greater, in America than in England, and, altogether, I think it would be well if our Government took a leaf out of the book of the Western Union Company."

A writer, in a letter recently published in the London *Times*, uses the following language in regard to the British telegraph:

"It can hardly be doubted but that, if the telegraphic wires of the country were in the hands of private companies and were administered by private enterprise, instead of being a Government monopoly, the public would gain largely in rapidity, cheapness, and extension of telegraphic communication. It appears more than doubtful whether the monopoly given by Parliament and the purchase by the Government of the telegraph lines in the United Kingdom have not proved to be errors, and whether the time will not shortly arrive when the administration of telegraphy should be taken out of the hands of the Government and again intrusted to private enterprise."

These gentlemen, who have had quite as good opportunities for observation as Colonel Price, do not appear to agree with him.

The Western Union Company undertook to develop and extend the telegraph in a rude and very extensive field. It was at the outset a hazardous enterprise; but it has managed to construct a very considerable system of lines.

It has established many offices, and has tried, in its poor way, to do a general telegraph business. Unfortunately, it has not succeeded in pleasing Colonel Price, of Scranton, and he now arraigns it for not doing so well as the Government of Great Britian.

The British nation is, in most respects, the foremost nation of the world. It is hardly fair to contrast the achievements of that great and powerful Government in comparatively a narrow field, with the operations of a private company, in a new and, to a great extent, an unsettled country of vast proportions.

However, let us examine Colonel Price's statistics. He gives us two sets of tables—one showing the progress of the telegraph in Great Britain under the control of the British Government, and the other exhibiting the growth of the telegraph in the United States under the management of the Western Union Telegraph Company.

The important features of these tables are reproduced below. Colonel Price's figures are assumed to be correct.

EXHIBIT OF THE BRITISH GOVERNMENT.

| | 1869. | 1880. | Increase. |
|---|---|---|---|
| No. of offices.. | 2,488 | 5,331 | 2,843 |
| Miles of line.. | 5,651 | 23,156 | 17,505 |
| Miles of wire.. | 48,990 | 100,851 | 51,861 |
| Number of messages sent in 1869. | | | 6,500,000 |
| Number of messages sent in 1880. | | | 26,547,137 |
| Increase | | | 20,047,137 |

EXHIBIT OF THE WESTERN UNION TELEGRAPH COMPANY.

| | 1869. | 1880. | Increase. |
|---|---|---|---|
| No. of offices. | 3,607 | 9,077 | 5,470 |
| Miles of line. | 52,099 | 85,645 | 33,546 |
| Miles of wire. | 104,384 | 233,534 | 129,150 |
| Number of messages sent by the Western Union in 1869 | | | 7,934,933 |
| Number of messages sent by the Western Union in 1880 | | | 29,215,509 |
| Increase in messages | | | 21,280,576 |

PROGRESS OF THE SYSTEMS COMPARED.

| | |
|---|---|
| Increase of number of offices in Great Britain, 1869 to 1880 | 2,843 |
| Increase of number of offices of Western Union, 1869 to 1880 | 5,470 |
| Excess of Western Union offices | 2 627 |
| Increased mileage of line in Great Britain | 17,505 |
| Increased mileage of line of Western Union | 33,546 |
| Excess of Western Union line | 16,041 |
| Increased mileage of wire in Great Britain | 51,861 |
| Increased mileage of wire of Western Union | 129,150 |
| Excess of Western Union wire | 77,289 |
| Increased number of messages in Great Britain | 20,047,137 |
| Increased number of messages of Western Union | 21,280,570 |
| Excess of messages of Western Union | 1,233,439 |

It may be stated that the average rate per message transmitted by the Western Union Company was in 1867 about $1.11. The average toll in 1880 was about 44 cents.

The average rate per message sent by the Governmental Telegraph in Great Britain in 1880 was about 29 cents. But the territory of the United States is about twenty-five times larger than that of Great Britain and Itcland

The proportion which the territory of Great Britain bears to that of the United States is in the ratio of one to twenty-five. The average rate per telegram in the two countries is in the ratio of one to one and a half. In the face of these figures, taken from his own tables, Colonel Price tells us that "no private enterprise would have dared so great an innovation as decreasing rates to one-half, and quadrupling the facilities."

Referring again to the statistics of the Western Union Telegraph Company, as published by Colonel Price, the following figures are extracted, showing the growth of this company during the two years, 1880–81 and 1881–82:

| | 1880-81. | 1881-82. | Increase. |
|---|---|---|---|
| Number of offices, | 9,077 | 12,068 | 2,991 |
| Miles of line | 85,645 | 131,060 | 45,415 |
| Miles of wire | 233,534 | 374,368 | 140,834 |

It appears that between 1869 and 1880, the British Government established 2,843 new offices. The Western Union Company has, since 1869, opened 8,461 new offices, of which 2,991 have been established since 1880. The total length of line in the British system in 1880 was 23,156 miles. The Western Union Company has *added* 45,415 miles within the last two years, and 78,961 since 1869! The total number of miles of wire in the British system in 1880 was 100,851. The Western Union Company has *added* to its plant since 1880 some 140,834 miles of wire, and since 1869 about 270,000 miles!

It will be seen from Colonel Price's own figures that the Western Union Company has, *within the brief space of two years*, added to its system nearly twice as much line and forty thousand miles more wire than the entire mileage controlled by the British Government in 1880. This, of course, includes not only all the line and wire constructed by the Government during the eleven years previous to 1880, but all which is purchased from the companies in 1869. And yet we are told "that no private enterprise can be relied upon to do the work as the Government does it, and that every change from private monopoly to Government has been accompanied with a marked reduction in charges and the greatest extension of lines and terminal facilities. These are the facts." Yes; but unfortunately, Colonel, these are not the figures.

The Colonel sees nothing in the telegraph of the British Government which is not altogether lovely. He tells us that up to 1879 the system had cost the Government over £10,000,000, or about $50,000,000, and that it "has been a profitable enterprise from the first." He publishes a table, however, which contradicts, as usual, the latter assertion; while the fact is that the returns for the year ended March 31, 1882, show an actual deficit over of half a million of dollars! In happy ignorance of this deficit, he rejoices that the Government lines yield a *profit* on the large capital of $50,000,000; but he exhibits well-defined symptoms of hydrophobia at the bare mention of a dividend by the Western Union Company on a capital of $80,000,000, based upon nearly six times as much line and nearly four times as much wire. The capitalization of the postal telegraph of Great Britain is at the rate of nearly $500 per mile of wire. If the 374,368 miles of wire in the Western Union system were capitalized on the same basis, the capital stock of that company would exceed $180,000,000.

This is absolutely heart-rending, and the news is broken to our friend in Scranton tenderly and with great reluctance.

Colonel Price tells us that the number of telegrams transmitted annually, in this country, is equal to about one-half the number of inhabitants; but he publishes a table which, of course, contradicts this assertion. The population of the country in 1880 was about 50,000,000. The number of messages transmitted by the Western Union Telegraph Company during the same year was 29,215,509. Therefore, that company alone transmitted 4,000,000 messages in excess of his statement.

There were many other telegraph companies in the United States in 1880, some of which did a large business. Among the more prominent of these were the American Union, the Atlantic and Pacific, the Northwestern, the Philadelphia, Reading and Pottsville, the Continental, the Mutual Union, the American Rapid, and many other smaller telegraph companies—working lines which, in the aggregate, were nearly, if not quite, equal to the mileage of the entire British telegraph system.

Toward the close of his address the Colonel asks, "What is government for?" Unfortunately, he does not answer the question. Let no one, however, imagine that he doesn't answer it because he can't do it. If there be any particular thing of which the Colonel knows more than he does about telegraphy, that particular thing is government. In the absence of his own answer, we can only infer that in his opinion Government is ordained to assume control of the telegraph and give us cheaper rates; but, if we inquire what the United States Government is doing now toward cheapening those rates, we are told that it levies duties on telegraph wire equivalent to sixty or seventy per cent. *ad valorem*.

Colonel Price is, no doubt, a very worthy gentleman; but he may be regarded as the latest exponent of a class of people who are driven to make melancholy spectacles of themselves by an unreasoning and unreasonable hostility to corporations and associations of which they form no part.

Some of these people, deluding themselves with the belief that their own narrow interests are the interests of the public at large, are often really influenced by a consuming desire to get something at somebody else's expense. Some are dominated by a vicious propensity to destroy what others have built up. Others are spurred on by an inordinate craving for notoriety. Some are simply panders to popular prejudices or popular delusions. Some are impelled by one motive and some by another; but nearly all are alike in one respect: they exhibit but little knowledge of that which they recklessly assault and blindly seek to destroy.

Colonel Price is a conspicuous example of this general characteristic.

It was not the purpose of the writer to defend, in this paper, the Western Union Telegraph Company; nor was it his purpose to oppose a Governmental telegraph. His design at the outset was simply to demonstrate the fact that Colonel Price has succeeded in delivering, before the Scranton Board of Trade, an address which contains not a particle of evidence that he possesses any knowledge whatever of the subject of his discourse. Here is a gentleman who assumes to instruct, on a very grave and important question, an association of business men who are presumed to have a special knowledge of statistics. His address is filled with reckless assertions and with tables of figures to support them; but it contains no evidence whatever that he has given the statistics the slightest examination for the purpose of ascertaining whether they support his statements or not.

In point of fact, his figures not only do not support his assertions, but actually contradict, in the most emphatic manner, every material statement which he makes.

Yet we find the President and Secretary of the Scranton Board of Trade, and the Judge of the Forty-fifth Judicial District of the State of Pennsylvania, uniting with others in a written request for the publication of the address to enlighten the Boards of Trade of New York and other cities throughout the country.

Whether the Government shall assume control of the telegraph lines and the telegraph business in the United States, is a very grave question, requiring something more than empty declamation and unsupported assertion to determine it. Undoubtedly much may be said on both sides of the question. He who would discuss it properly and determine it wisely must lay aside his foolish prejudices. The cause cannot be advanced among thoughtful men by vilifying the foremost telegraph company of the country and of the world.

It is generally believed that the methods of our Government are not pre-eminently economical, nor particularly thorough or expeditious.

Take, for instance, the United States navy. The Government has during the past twelve years expended on this branch of the public service two hundred million dollars, and it will require many millions more to put it in proper condition for active service.

Although the navy has been so long established, and although vast sums of money have been expended on it, it is not to day in condition to perform the service for which it was created. This cannot be said of the Western Union Telegraph Company. Who believes that the value of the United States navy is as great as that of the Western Union Telegraph Company, either intrinsically or for warlike or peaceful purposes?

Whether the Western Union Company has or has not met the public expectation in regard to the increase of its facilities, no Government, so far as the writer knows, no public or private enterprise, here or elsewhere, has approximated it in this respect.

Reasonably cheap telegraphic rates are, of course, desirable; but low charges are not of paramount importance in determining the question of a Governmental telegraph. Other and far more important elements enter into that question.

It is gratifying to note that the tendency of all the telegraph companies in the United States is constantly toward lower rates. Taking into consideration the extent of the territory and the comparative cost of labor and material, the rates are now lower in this country than in any other. Nowhere on the globe, except in the United States, can a telegram be sent for one dollar between two points four thousand miles apart.

The Colonel speaks of the reduction of press rates in Great Britain to one shilling for one hundred words as "a noble daring in behalf of the public welfare." There is a nobler daring (if that be what you call it) in the United States, where the newspapers generally get the great bulk of the press news at a much lower rate, as the Colonel can probably verify by consulting the Scranton editors.

The Colonel tells us that, "under our system the Western Union and the Associated Press now have an arbitrary and despotic power when they choose to exercise it."

There are numerous press associations in this country. The New York Associated Press is probably the one referred to. This is simply a partnership of seven of the daily newspapers of the city of New York, formed for the purpose of gathering news in various parts of the world and transmitting it to New York for publication in the newspapers comprising the association. This news is also sold to other newspapers and associations throughout the country. They buy the news of the New York Associated Press simply because they get it at a cheaper rate than they can gather it for themselves.

Can it be possible that under this beneficent guise the Associated Press has entered into a deep and damning conspiracy with the Western Union Telegraph Company to assume "arbitrary and despotic power"?

The Colonel appears to have information of some diabolical plot which should no longer be concealed from an excited and anxious public. It is an imperative duty which our friend in Scranton owes to the American eagle, and the pneumatic tube, to make a clean breast of it without any further delay."

## Underground and Submarine Wires.

In England wires are almost invariably carried underground through towns. Copper wire, insulated with gutta-percha, encased in iron pipes, is the material used. There are 12,000 miles of underground wire in the United Kingdom. There is a great outcry for more underground work in England, owing to the destruction to open lines by gales and snow-storms; but underground telegraphs, wire for wire, cost at present about four times as much as overground lines, and their capacity for the conveyance of messages is only one-fourth; so that overground are, commercially, sixteen times better than underground wires. To lay the whole of the Post-Office system under ground would mean an expenditure of about £20,000,000. Hence there is no desire to put wires under ground except in towns. Besides, snow-storms are few and far between, and their effects are much exaggarated.

Of the numerous materials and compounds that have been used for insulating purposes, gutta percha remains the oldest and the best for underground purposes It, like all other materials used for telegraphy, has been improved vastly throughout the searching power that the current gives the engineer.

The past ten years has seen the globe covered with a net-work of cables. Submarine telegraphs have become a solid property. They are laid with facility and recovered with certainty, even in the deepest oceans. Thanks to such expeditions as that of H. M. S. Challenger, the floor of the ocean is becoming more familiar than the surface of many continents.

There are at present 80,000 miles of cable at work and £30,000,000 have been embarked in their establishment. A fleet of twenty-nine ships is employed in laying, watching and repairing the cables. The Atlantic is spanned by nine cables in working order. The type of cable used has been but very little varied from that first made and laid between Dover and Calais; but the character of the materials, the quality of the copper and the gutta-percha, the breaking strain of the homogeneous iron wire, which has reached 90 tons to the square inch, and the machinery for laying, have received such great advances that the last cable laid across the Atlantic by the Telegraph Construction and Maintenance Company was done in 12 days without a hitch or stoppage.—*Ex.*

## Honors to Dr. Green.

WESTERN UNION'S PRESIDENT ENTERTAINED BY MR. JOHN PENDER, M. P.

LONDON, April 30, 1883

A complimentary banquet was given to night to Dr. Norvin Green, President of the Western Union Telegraph Company, by Mr. John Pender, M. P., at the Ship Hotel, Greenwich.

There was a large number of guests present, prominent among whom were Sir Hussey Vivian, Sir Sydney Waterlow, Prof. Rogers, Mr. Geo. Armistead, Sir George Elliot, Mr. William Cartwright, Sir Evelyn Ashley and Mr. John Puleston, Members of Parliament; Admiral Sir Sydney Keppel, Messrs. W. S. Cunard, Barber, Pender, Fuller, Ford, Wells, Weaver and James O Green, son of Dr. Green; Count Lambertye and MM. Pouyer-Quertier and Leon Riant.

The menu was excellent and was generally appreciated by the whole company.

Mr. John Pender, in proposing the health of her Majesty the Queen, said her dominion extended over America, where she is as much loved and esteemed as in England The next toast was to President Arthur. Mr. Pender said he hoped and knew it would be drunk as heartily as that to the Queen. The President never died, but there were occasions when he was stricken down by the hand of an assassin On the last occasion that this happened England, and its Queen above all, expressed such heartfelt sympathy as can never be forgotten in America.

Viscount Bury, replying to the toast to the House of Lords, thought it was a great honor that its health should be drunk by such a distinguished company. When—if ever it should come—the House of Lords should be abolished, he would apply for the post of electrician to the combined cable companies. (Mr. Puleston—and a very good position, too.)

Mr. Pender, in proposing the health of Dr. Green as the toast of the evening, said that before submitting it he must apologize, on account of illness, for the absentees, referring to Lords Monck and Tweeddale and Mr. James Anderson. Continuing, he said: "This is the Doctor's first visit to Europe, and that fact is the only fault we can find. But he has told me that he has looked forward to visiting the old country, and I am convinced that England is as ready to honor him as he is to honor England. The position of Dr. Green as president of the Western Union Telegraph Company is one of the most arduous and responsible in America. He fulfils the duties of his position with the greatest credit and ability, and I can tell you such a position requires a man of vast ability and unimpeachable honor. I think it always well on occasions like the present to justify the man by the statistics. I was never more struck than by the American telegraph statistics. Dr. Green presides over a company with $80,000,000 of capital, 13,000 stations and 20,000 employes. The company owns 400,000 miles of poles and 425,000 miles of wire. During my visit in America and Canada I found no part or district without a Western Union station. The car wherein I travelled was stopped by a small white flag and a telegraphic message was handed me conveying the news of the Tel-el-Kebir victory. I replied, congratulating Sir Garnet Wolseley, and I was afterwards told by him that before sunset of the same day he had the answer. (Applause.) The progress of the Western Union Telegraph Company has been most astonishing. In 1866 there were 75,000 miles of wire and 2,250 employes. The profits were over $2,500,000; they are now $8,000,000.

The company pays a dividend of 7¼ per cent. The actual profits would warrant 12 per cent., but the difference is applied to the reserve. Statesmen have not yet realized the importance of telegraphy. The system of telegraphy has been followed up and developed with dogged perseverance. The result is that it has brought the world more closely together than people have any idea of. The object and mission of telegraphy are peace and unity, and it has done more in this direction than any political or social efforts have accomplished. When we consider that almost every commercial transaction necessitates the use of the telegraph, we must understand what a vast influence the telegraph controls. In earlier times the idea prevailed that when the cable was broken it was irreparable. Now it is known that we are as much masters of the submarine cables as of the railways. The cable to the Cape, I am sorry to say, was broken again this morning, but I am confident that it will be repaired in a day or two by exertions which will have the benefit of the experience gained by the last breakage, which so seriously inconvenienced us. The Colonial Office necessitates from the Western Union Telegraph Company magnificent service, which is not to be compared with any other in the world; and when I think of the pleasant two months that I spent in America, and of the vast multitudes pouring into the country, to increase the producing and consuming power, I know what the future of the United States will be. Telegraphy is the element of social, political and commercial unity. Who can foresee the incalculable results that must proceed therefrom. I drink to the head of the telegraphic system in America, and long may he be spared to continue in the good work he is now doing."

"I feel," Dr. Green in replying said, "an overwhelming sense of the great honor done me. After seven days' disagreeable rocking on the ocean I am delighted with such a welcome. I had an idea that on coming to this vast metropolis a person lost his individuality, but suppose from my being selected for such distinction that I am the exception that proves the rule. I see before me in a strange land the American and English flags entwined. They are the symbol of the cables uniting the two countries. It is true, I have always wished to visit the mother country, although it is not so much different from America. Your common law is ours, your bill of rights and decisions of personal and civil rights are models for ours. On the other hand, I notice that you are progressing and improving in science after us. It is said the sun never sets on British soil, but it takes nine hours for it to rise on our telegraph system. We claim to do the sharpest telegraphing work. As an instance, the closing London prices at 3 o'clock in the afternoon are published in the San Francisco evening papers. I have seen in New York a clerk dispatch a commercial message from the Produce Exchange to Chicago and receive an answer while waiting at the counter. (Applause.) The business from New York to London would be doubled if we could, as in the case of Chicago, receive an answer as soon. And just as telegraphy can overcome time and space, so will it progress. There was a battle at New Orleans in 1812, where the English General, Packenham, was killed and his body sent home. This was fifteen days after the peace had been signed. If telegraphy had been in its present state then Packenham would have been saved, with the 700 who were killed with him." Dr. Green concluded with expressing thanks for the great honor done him

M. Pouyer-Quertier, in proposing as a toast "The Progress of Telegraphy," said it was unfortunate that he could not express his sentiments in English. He hoped the existing unity among the companies would always continue. "I am happy," he said, "to again shake hands with Dr. Green. We owe Mr. Pender for his exertions in bringing about the amalgamation with the French Telegraph Company - such a small affair that people are astonished it can do such service as to prevent troubles and wars. In conclusion, as you are all friends of telegraphy, I know you will drink heartily the toast I propose."

Sir George Elliot, replying in a brief speech, said: "I am afraid I shall not do much more than to put you all in the right track to provide for the future of cable systems."

The party returned to London at 11 o'clock, after a most enjoyable evening.

The authorities of Puebla have granted an exclusive right to the Mexican Telephone Company to maintain a telephone exchange in that city for a period of fifty years. Five minutes' conversation between this city and Puebla will cost fifty cents.

For interesting news, tersely told, read Our Mexican Letter, No. 4, from our E. C., Vice-President Wiley.

# Telephonic.

## The Peculiarities of the Telephone and Its Users.

In the REVIEW of April 12th, appeared an article of something upwards of a column in length, which in a quasi-humorous manner dilated upon the diabolical enormities of the telephone; and with much melo-dramatic and exaggerated display of injured innocence dwelt at some length upon the depraving influences of the said instrument, exerted upon all with whom it comes in contact, whether the helpless and innocent subscriber or the fair presiding priestess at the central office. The article concluded by criticising a new addition which was assumed by the writer to be contemplated, and which evidently in the opinion of the said writer, would cap the climax of insult; pile Ossa upon Pelion; gild the refined gold; or paint the lily. This improvement purported to be the introduction of certain devices by which any one calling the central office from the office of a subscriber is instantly photographed, and his photograph flashed with lightning swiftness over the wire, and exhibited to the operator at the central station.

The article of which the foregoing is a synopsis, is marked with the two letters in italics, "*Ex.*" Whether these letters mean "extravagant," exaggerated," "exasperating," "extraordinary" or "exchange," boots nothing; it might import any or all of them.

It cannot be denied, nor would any conscientious person knowing anything of the telephone, seek to deny it, that the instrument has many idiosyncracies, and that it is a powerful and accurate reflector of the good and bad qualities of the persons who use it. The transmitter is very much too apt to work always, except when it is most wanted. If you speak gently to it, too frequently it takes no notice of what you say, and if you shout it breaks.

Very likely your friend at the other end of the line can hear all you say, but you can't make out a word of his oration. Quite possibly, when you call for a certain party, you get a different person. You call, for example, for John Rudolph to order a noonday cocktail; and instead of that important functionary, you get perhaps the sexton and undertaker of St. Sepulchre's Church; which although thoughtful of the operator is somewhat premature.

In the middle of an important conversation you hear the unwelcome "Hello" in dulcet tones; and if you go away for a moment, you find on returning that you are irrecoverably cut off, and in short that either yourself or your friend has got left.

Let us, however, cogitate calmly and impartially upon the subject, and try to ascertain how much of this iniquity is due to the telephone *per se;* how much to the telephone aided and abetted by its manipulators; how much to the chronic grumbler himself; and when we speak of the chronic grumbler, we have no special reference to the writer of the Ex * * * article, but to all of the class which by no means the most prompt in paying their monthly bills, regard the privilege of finding fault, merited or the reverse, as their most valued prerogative.

The telephone is of man's invention, and that on the whole it is a useful invention is manifest; and is proved by the fact that over 250,000 are now in use in the United States. That it is, and has from its introduction, been regarded universally as a valuable invention is further proved by the number of modifications and so called improvements which have so continually been brought into notice, and which in many cases have formed the nuclei of stock companies, enriching their projectors by means of the magic word "telephone," which induces people who know no better to invest their hard-earned savings in these enterprises.

It is not only of man's invention—it is of man's manufacture It is therefore liable when used to get out of order. It cannot be expected that an instrument that is daily used will not show the results of wear and tear; and yet the telephone user, reasonable in all else, who fully realizes that the shoes he wears sometimes need to be mended and must go to the shoemaker, who perhaps wears out three hats per annum, who if he keeps a carriage, fully expects to occasionally have the axles greased, cannot for the life of him understand why the most delicate scientific instrument known, once in a while fails to act satisfactorily to him, and although his telephone may have worked perfectly for six months, if it fails in a single instance, he curses it all the same, and adds falsity to profanity upon the arrival of the unlucky inspector, and boldly alleges that the blanked thing never worked.

One of the first and most unqualified assertions of the Ex * * article which we have cited is that "each individual telephone has proved to be productive of more angry passions and violent profanity than could be occasioned by a regiment of the most exasperating lads."

We much fear that our paragrapher never saw or heard anyone using a telephone, save his own sweet self, and that self-judged he is one of those who in Cincinnati would be regarded as "wicked partners," and be denied the boon of a telephone for that reason.

It is freely conceded that the telephone has been the recipient of much liberal, vigorous and unsanctified objurgation, partly deserved no doubt, but also partly undeserved and unreasoning.

For while it has been sworn at, to and against, it is not believed that any person ever swore his first oath at the telephone. It is only those already proficient in fracturing the third commandment who swear at the telephone.

There are so many causes operating against the successful working of the telephone that to those who know anything at all of the art of electrical communication, the marvel is not that it is sometimes defective, but rather that it is not more frequently so.

When a subscriber wishes to communicate with another he calls, or attemps to call, the central office; and we will suppose that he fails to attract attention. Now he, of course, ascribes this failure to the neglect of the gentle being who presides over the switchboard; it never occurs to him—how indeed can it? that his line is crossed with another just outside of his own building and within sight of his window. He cannot be supposed to know, that although he has kept a register grating open all winter producing a steady hot blast of upwards of 80° Fahrenheit upon the transmitter battery that the battery fluid can evaporate, and with its evaporation carry away his motive power. How can he, in his innocence, understand that when he gets angry, and dashes down his receiving telephone, that he is breaking his telephone cord, or wrenching the tag from the binding screw, and thus preparing condign punishment for himself the next time he starts out to give a lesson in elocution by telephone. Good, easy man, how should he know these things?

And long may he remain in this blessed state of ignorance, for there have been cases where the subscriber has developed an experimental taste for electrical science, and such a subscriber is worse than a tame crow; for the experimental subscriber empties the sal ammoniac solution from his battery and refills it with water, just to see what it will do. He is ever ready to readjust his transmitter, when his correspondent's receiving telephone does not work well. He invariably chokes his bell with paper, and then files a complaint that it won't work. He pulls his magneto bell to pieces, and puts it together again after a fashion. He unscrews his telephone cap, and when he puts it on again manages to get the diaphragm upside down, and to strip the screw thread so that he can't screw the cap down; or if he escapes that evil, he screws it down so hard that the diaphragm hardly has a chance to vibrate at all, and many other iniquities is he capable of committing, which we have neither space nor time here to enumerate.

But to advance a step. We may now suppose that our subscriber succeeds in raising the central office, as the most grumblesome grumbler acknowledges is occasionally done; he gives his order 293, wants 29. Very likely he is at once placed in connection with 29, and finishes his communication in peace. Does he credit this as a point in favor of the vigilance of the central office? No; that doesn't count at all.

Possibly, however, as in the Ex * * article, the "girl who manipulates the wires" does reply that the person you want is "talking now." Why not? It is just what you desire to be doing yourself. Did your friend subscribe for his telephone solely for your benefit?

Do you stop to consider that there may be 2,000 subscribers connected with that exchange, and that your friend, equally with yourself, may once in a while desire to avail himself of his undoubted privilege to converse with some of the 1 998 who, in common with yourself, use the telephone? Or, perhaps, you think that no matter who 29 is talking with, they ought at once to be dis connected to give place to you. We are all rather apt to think that way, even if we don't say so.

Another alternative presents itself. After the lapse of a few seconds, which to your excited imagination seems hours, you receive the notice, "29 don't answer." Again, as you acknowledge, in your heart you blame the telephone office. Now, how on earth can the central office help it? If Mr. Jones takes a notion to go out and lock up his office, whose business is it but his own? Isn't it better that it should be thus than that you should walk a mile to see him, and then find him out? Or if Jones knows or suspects that Dunham wants to dun him by telephone, and therefore lies low and doesn't answer at all, whose concern is it but Jones's?

These supposed cases are of constant occurrence, and are by no means exaggerated; but it is always to be noticed that the calling subscriber invariably regards them as a deliberate affront to himself on the part of the central office. With respect to the long drawn-out tones which our paragrapher objects to, it is to be devoutly hoped that he himself and his congeners will sooner or later also adopt those same deliberate tones, and they will then be able to talk over the telephone wire better than they seem now capable of doing.

Now let us look at the business from the central office point of sight, and we shall then see that in some degree the patrons of the telephone are to blame for their own lack of success. First, let us consider that to constitute a telephone exchange more than *one* subscriber is requisite.

This is a well-known fact in the central office, but it may be a novel idea to some subscribers we wot of, who appear to believe that the sole object of the existence of the exchange is to fear them and glorify them forever. In the exchange of a large city, moreover, not only is there, as above stated, more than one subscriber connected with the office, but each operator usually has a considerable number of subscribers, and subscribers' lines, to look after, all the way, in fact, from 50 to 150.

It follows that occasionally more than one will call at once, and as first come first served is the only equitable rule, the first one is served first, and the others have to wait a few seconds; or, if it cannot be told which is the first, they are taken at random; but in no case is the waiting long, as usually all the orders are taken before any are filled. This is necessary, that the calling subscriber may be satisfied that he is being attended to. Of course, the unlucky one who is not first feels neglected, and growls. But why? Simply because he don't know why he shouldn't be answered on the second. But suppose he *is* the first, and the next is answered before him, what happens? Why, then he growls again. What is sauce for the goose is *not* sauce for the gander with telephone subscribers.

But the waiting is over. Simkins gives his order, "Connect me with 290," and the much-enduring operator rings up 290. If 290 is there, and is a reasonable man, he responds promptly, and is told that 202 wants him; and if Simkins has kept within hearing distance like a man, he is at once notified, and the conversation proceeds. But, as any one following carefully the process may imagine, there is abundant room for a hitch.

First comes the alternative that 290 is already engaged with some one else. There may be 1800 subscribers connected with the exchange, and it is within the bounds of possibility that 290 believes that his telephone is for him to use; and since there are certainly 1799 subscribers whom he may, if he pleases, call upon, nothing is more likely than that he should avail himself of his undoubted right. Of course, in that contingency, Simkins is notified, and equally, of course, Simkins regards the affair as a personal insult, and raves. Not that Simkins would in such a case prefer to be ignored. Oh, no; that would be flagrant neglect, and also warrant a growl.

But 290 is not in his office, and of course cannot be signaled; or 290 is there, and won't answer; what can the hard-worked operator do but, after ringing several times, call up the original subscriber, our friend Simkins, and report that 290 don't answer? Whereupon Simkins lays the flattering unction to his soul that the operator hasn't tried to fill his order; being, as the article which constitutes our text delicately puts it, "conversing over the wires with her young man."

Here I imagine a thrill of incredulity to pass through the mind of some reader of the above statement. What! a subscriber hear his bell ring, and not answer? Surely, that cannot be. Unfortunately, it is too true. I have been in the office of a telephone subscriber, and I have heard his telephone bell ring, and I have heard him give utterance to the remark, "Oh, it is only the telephone; they will ring again if they want anything."

It is a fact that there are many of that suffering race who, while always ready to use the telephone when they themselves want anything, will never take the trouble to respond when they are called. This at one time became so flagrant an abuse in many cities that it became necessary to issue imperative orders to the operators never to ring more than three times for any subscriber.

But allowing that 290 does his duty, and faithfully responds if he is there, there is still another chance for the subscriber to immortalize himself. That is, Simkins himself, after stating that he wants 290, instead of staying near the telephone, where he can hear the ring which is to notify him that all is ready, feels it incumbent upon him to go down the cellar to shake his furnace, or upstairs to unlock his skylight, or out to the post-office, or over to Delmonico's for two milk punches and a ham sandwich; and, of course, although he calculates to be back before he is rung up, his intentions are better than this performances, and after the operator has rung his bell the regulation trio, she is compelled to give it up and tell 290 that she can't raise Simkins himself now. 290 goes off feeling that he has been played for a sucker; Miss Pollie Rization is provoked because she has had all her trouble for nothing; and Simkins himself assumes the role of a martyr, and writes an affecting story to the president of the telephone company, dilating upon his wrongs.

Another well-worn grievance is that, while you are talking, the siren-like tones of the operator are sure to interpolate the magic "Hello!" which means here, "Have you finished talking?" Now, this has considerable ground to stand on, because we have all experienced it, but it is by no means so bad as it used to be. And why? Simply because the subscribers have improved. Instead of hanging up their telephones when they finish talking, and giving no sign, a large majority of them (of which, by the way, our friend Simkins and his kinsmen form no part) now, as soon as they finish and hang up their telephone, send in a short ring, which drops the central office annunciator and notifies the operator to straighten the lines. If all subscribers would do this, the "hello" nuisance would as by magic cease.

In conclusion: It is, of course, thoroughly understood that the column which has herein been referred to is not a serious charge, or series of charges. The concluding para-

graph, if no other, settles that. It is obvious that the article was written by the funny editor of some newspaper, and it is so taken; but it is nevertheless true that often a sentiment as unjust as it is uncalled for has pervaded the daily press (which to an extent unequalled in any other country forms the opinion of the public) with regard to the operation of the telephone exchange, and many thoughtless remarks have been made concerning the supposed neglectfulness of the operators; and for the purpose of saying one word in the favor of a most painstaking and conscientious class, and to show that the errors are not all on one side, this article has been written. If those who daily use the telephone had, in the early days of the telegraph, been brought into equally intimate contact with it, they would be more patient. But, unlike the telegraph—which has, for its practical operation, always been in the hands of specialists and experts—the telephone has, from its inception, been in the hands of the public itself, and has, perhaps, proved to be the most efficient popular lecturer on electrical science that has ever approached the subject. Therefore, on this account, if no other, let us possess our souls in patience, and he that is without imperfection among us, let him be the first to throw impatient words at the telephone operator

T. D. L.

## The Blake Transmitter.

The microphone is one of the most remarkable of the many instruments which science has given us. The delicate action of its most perfect and practical representative, the Blake Transmitter, in responding to faint and distant sounds, has often been the theme of remark, and perhaps no illustration will more fully exemplify its varied application than its use in churches and public halls.

It is with no idea of presuming to offer any new suggestion to the veteran telephone manager that these few reminiscences are sent to the REVIEW. But if this brief outline of early experiments and later successes should catch the eye of a pioneer in some yet unimproved territory, the record of four years ago may stimulate him to interest and instruct his few subscribers, and illustrate in a very attractive way the capabilities of this most marvelous invention, the speaking telephone.

Early in 1879, while Blake's improved microphone was yet very young, the writer secured the first specimen which was loaned from the Boston factory, at 109 Court street, for public-hall experiment. Its powers were so little understood that no specific instructions accompanied it beyond the simple matters of battery and line connection. In form it was somewhat longer and larger than the standard pattern afterward adopted, with a heavier induction coil, and its adjusting screw was brought through the box, facilitating ready modification without opening. It is probable that but very few of this variety were ever made, as none appear to have been supplied to the exchanges of that date.

A few experiments showed not only the superior powers of loud and distinct transmission now so well known throughout the civilized world, but also the wonderful delicacy of action by which faint sound vibrations from a distance might be caught up and reproduced miles away. At that time a Taunton musician was rehearsing a Brockton chorus for the cantata of "Queen Esther," and the idea of obtaining an echo of the hall entertainment at the residences of a dozen subscribers at once suggested itself. Fortunately a valuable assistant was secured, in the person of C. E. Austin, of Providence, then as now in the employ of L. W. Clarke, the well-known electrician of that city. Though so intimately acquainted with Bell's instruments as to be mentioned by Prescott as one of the pioneers in experiments with receivers, Mr. Austin had never before seen a Blake. After some calculation, the transmitter was attached to a device known to theatrical men as the "rain-box," in this case suspended midway by an iron axis about twenty feet above the stage, and fastened at an angle of forty-five degrees. The mouthpiece of the little talking machine thus opened downward at the same inclination, and a careful adjustment showed this position to be a very favorable one for distinct transmission, for in some hundreds of later experiments no more satisfactory results have ever been secured. The battery was two cells of gravity, kept on closed circuit until it attained a maximum working strength, and placed within a few feet of the transmitter. On connecting with the line the effect was most gratifying. The footsteps of the soloists, as they came forward to their places, their parts in the programme, whether heavy or subdued, the harmony of the orchestra, dividing itself to the ear of a musician into its dozen or more parts, which could be perfectly followed out, the volume of sound from the chorus of a hundred voices, the applause of the audience, the shifting of scenery, the "curses not loud but deep" of the stage-manager between the acts, and the ringing down of the curtain, all came out clearly.

The comments of one of the local papers in its next issue, January 23, 1879, forms somewhat peculiar historical reading to-day:

"On Tuesday evening the persons having instruments connected with the wires of the Brockton Telephone Company enjoyed at home the first public entertainment ever transmitted by electro-magnetic action without the knowledge of the musicians participating. The New England branch of the Bell Telephone Company have for several months had experts at work on an idea which has now been brought to a successful issue in the new 'battery telephone.' This wonderful instrument not only transmits and renders audible to the holders of receiving telephones at distant points the sounds poured directly into its mouth-piece, but catches as it were the faint air-vibrations at a distance from their source, and intensifying them by its inductive mechanism, sends forth any combination of harmony which may be produced in its neighborhood. The entire cantata of Queen Esther was reproduced at each station on the several miles of radiating wires with a degree of clearness and force which surpassed the expectations of those most interested, and created quite as much enthusiasm among the widely separated listeners as among the eye-witnesses of the performance."

From this time Brockton subscribers were similarly entertained more or less regularly for two years, until the increase of business prohibited such use of the wires.

At times the transmitter was thirty feet or more above the stage, and being placed in normal position was reached by a large cardboard tunnel terminating in a tin tube curving through a partition behind which the instruments were suspended in a box swinging horizontally on hinges. Here, far above proscenium arch, flies and all the movable paraphernalia of the stage, the operator could sit while testing the efficiency of the instrument, and in the midst of an entertainment readily readjust in response to signals from the central office.

The amount of time and careful attention involved in keeping a transmitter up to "concert pitch" for such purposes is however only appreciated by those who have undertaken it.

The same is true of a rendering of church services. From February 1, 1880, to the opening of 1882, instruments were constantly in operation in from one to three churches. Here, as with the theatrical experiments, it was found that the suspension of the transmitter in any manner which cut off the reinforcement of the vibrations of sonorous bodies weakened the results. Often this would not be noted on exchange lines, while a connection with a wire of 20 to 50 miles would instantly detect the lowering of the electromotive force of the current, or the reduction of the amplitude of the vibrations. A small ornamental bracket, finished to correspond with the style of the desk and placed just opposite the speaker in front of the Bible, when connected rigidly with the desk and the transmitter, showed the clearest and most far-reaching tone. Thus disposed, with two cells of gravity battery near at hand, the short line from the switch-board grounded on a gas-pipe in the church, has repeatedly been at one time connected satisfactorily with Boston, Salem and Gloucester on the north, and Taunton and Fall River on the south, including at least six switch-boards and 100 miles of lines, with other grounds at the extremes. Operators at these offices could hardly be made to believe that the speaker was four feet and the choir eighty feet from the transmitter, while in favorable weather they could hear every word spoken in the pulpit from invocation to benediction, and follow all the choral selections from the further end of the church.

It is a lamentable fact that privileges of this kind encourage extreme laziness on Sunday morning, and probably influence some careless ones to lie on the lounge at home, with telephones at their ears, during the services of the sanctuary, when they are physically able to lend their bodily presence to the inspiration of its exercises.

When confined to the short wires of a small exchange, the Blake gives, if possible, still more remarkable evidence of its efficiency. As many as fifteen circuits, of three to six subscribers each, have here been attached, to one church, with no great reduction in volume of tone, except on an occasional wire of extra resistance. If a change of preachers at the First Congregational Church displeased any listener, it was an easy matter to signal the office and ask for a connection with the Central Methodist. Thus all reasonable requirements were gratified. A gravity battery, if left on open circuit, or closed on a high resistance, lasted for two or three months without renewal, and in many cases the increase of internal resistance has seemed to be far from disadvantageous.

In some few experiments the past year one and occasionally two cups of "prism" battery have been used to advantage, and with their high intensity have been found to show an unexpected constancy. Even when left on closed circuit for three hours, they recover in two or three days, and so last for some months. The main difficulty seems to be the rapid action of the current on the carbon surface, necessitating a frequent use of a fine abrasive, and careful polishing with plumbago, preferably with finely-powdered stove blacking, slightly moistened.

The tone of such instruments, as well as of those constantly used for extra territorial lines, is also deepened and improved by an Edison induction coil, with a secondary resistance of about one hundred ohms in place of the regular Blake coil. The recent experiments in long-distance transmission indicate that practical improvement is to be looked for not alone in new and more powerful microphones, and perhaps not as much in these as in lines of high conductivity, like the copper wires of the postal telegraph, and in such connections as will secure the strongest action of our present instruments. The Blake transmitter, with its carbon carefully polished with plumbago, secured either directly or by a wooden bracket to a wooden partition, reinforced by an Edison coil and actuated by a deep masculine quality of tone, proves a serviceable instrument on good lines of fifty to one hundred miles, while a less careful arrangement will limit its usefulness to less than one-half the distance.

A word regarding the use of special devices for entertainments. E. F. Greenfield, well known as the former superintendent of the Bell Exchange in New York, now with the Edison Electric Illuminating Company, secured very good results on several lines from one transmitter by connecting the primaries of two or more coils in multiple, with one battery and carbon, and attaching two circuits to the secondary of each coil. Thus with two coils, four lines might be connected as two, with grounds only at their remote offices, and without possibility of interference.

The article published in your columns some time ago by T. D. Lockwood, referring very kindly to some little tests here, suggested a trial of transmitters for music. A black-walnut board three feet square and one-quarter inch in thickness, was suspended over a piano by heavy electric cords from the ceiling. Three transmitters were fixed near its center, their carbons connected by long spirals to the primaries of three Edison coils a few feet away, and each with two cups of prism battery. By a combination of snell jacks on the base holding the coils, the secondaries of any or all combined could be coupled instantly in series or in multiple arc, and careful tests showed a decided advantage in the use of more than one, and the loudest tones were secured by the three in multiple. Unfortunately the twenty-five mile line to Boston was heavily grounded, and the connection with Manager Manson's residence in Chelsea for mutual pleasure failed of complete success, but the results were undoutedly the best ever attained here.

Now, will not some of your many telephone readers follow this long and prosy talk with sketches of their own experiments? OCCASIONAL.

Brockton, Mass., April 28, 1883.

Mr. Joseph Jepson, of Westfield, Mass, has invented a new improvement in switch-boards for telephone systems. The object is to enable the operator at the exchange or central office to connect any two circuits of the system by a single plug connection, and to similarly connect any two sections of the switchboard, and also to include an office transmitter and receiver in the circuit when any two line circuits are connected

The above combination consists in an improved switchboard, of a series of circuit-strips, each connected with one of the circuits of the system, a series of connecting wires, each connected with one of the circuit-strips, and a series of plates or disks arranged at right angles to the length of said strips, said disks and strips alternating with each other, and each alternate disk in a direction at right angles to the length of the strips being connected to the same connecting wire, whereby any two circuits in the system may be electrically connected by a single plug at either one of two places.

Alderman Kenney introduced in the Board of Aldermen, on the 2d instant, a resolution giving permission to the Western Union Telegraph Company to lay wires, pneumatic tubes, and other necessary fixtures under the streets of the city. As compensation for this franchise the company is to pay to the city one cent per lineal foot of street opened, and to give the Police and Fire Departments the free use of one wire each. Alderman O'Connor at once moved that the resolution be laid over and printed. Alderman Kirk opposed the motion, and it was lost. Alderman O'Connor then moved that the resolution be referred to the Committee on Law. The Western Union Company, he said, would not like to have the resolution smuggled through as if there was some scheme in it. The motion was lost by a vote of 7 to 15. Alderman Grant asked why the Western Union Company was charged only one cent per lineal foot, when the New York Electric Lines Company had been charged 2 per cent. of its gross receipts. Alderman Kirk replied that it was because the Western Union Company had to give two wires free to the city. Then the resolution was adopted.

The State Department at Harrisburg, Pa., has granted a charter to the Delaware and Atlantic Telegraph and Telephone Company in the counties of Chester, Bucks, Montgomery and Delaware, with a capital of $10,000. The general route and points to be connected are as follows: Philadelphia to Chester, Media and State line via Derby, Philadelphia to Coatesville, and thence to Lancaster County, with lateral lines to West Chester, Norristown, Phœnixville, and other points.

The Laredo *Times*, announcing the arrival in that city of Mr. J. J. Ghegan, general manager of the Compañia Telegráfica-Telefónica Mexicana del Norte, with headquarters at Saltillo, says that Mr. Ghegan established telephone communication, by means of the Mexican government wires, between New Laredo and Monterey, a distance of 225 miles the route the wires run, and a very satisfactory experiment was made in its use, notwithstanding the long distance and impromptu arrangements.

# Electrical Review,

FORMERLY REVIEW OF THE

Telegraph and Telephone.

Published Weekly at 23 Park Row.

P. O. BOX 3329.

GEO. WORTHINGTON, Editor. THOS. H. DELANO, Publisher.

SUBSCRIPTION.

United States and Canada, $3.00 per annum, in advance.

Great Britain and other foreign countries, $4.00, in advance. Postage free.

ADVERTISING.

Transient rate, 25c. per line each insertion.

"Business specials," 35c. a line.

EDITORIAL ANNOUNCEMENT.

Address all communications and make all checks and P. O. orders payable to order of Delano and Company, Proprietors. P. O. Box 3329, New York.

*We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.*

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From whom copies of the paper can be procured.

The Montreal News Company, Montreal, Canada.
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H. A. Kramers & Son, Rotterdam, Holland.
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NEW YORK, MAY 10, 1883.


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## Doubting Thomases.

When the subdivision of the electric light was announced, the learned gentlemen who spend their lives in the pursuit of chimeras looked skeptical, dozed over the subject, and then stoutly denied the truth of the report. The evidence of their own eyes, however, finally induced them to believe that such was the fact, and they returned to their laboratories. Then it was practically demonstrated that power could be economically transmitted to a distance—a proposition which these learned gentlemen had previously denied the truth of—and their cup of bitterness was full. It still remained to them the melancholy satisfaction of questioning the accuracy of the data furnished of the experiments looking to this end, and to this they would seem to have given much attention.

Quite recently M. Deprez, from the machine shops of the *Chemin de fer du Nord*, in Paris, transmitted large amounts of electrical power to distances of ten and twenty miles with a loss, as claimed by him, of 32 per cent. while *in transitu*. The fact itself could not be denied, for the experiments had been made in public, and so the class of scientific gentlemen alluded to set for themselves the task of finding fault with the methods employed by M. Deprez in estimating his results.

The English prints, both scientific and popular, attacked M. Deprez with great bitterness. The fact that a Frenchman had anticipated the Briton in such an important field was too much for insular forbearance. It was said that M. Deprez had greatly overestimated his results; that he had used a means of proving his assertions that would not bear close scrutiny, and many other things.

Happily for M. Deprez's reputation, however, there was one man in England who could not be hoodwinked. Professor C. W. Siemens, than whom a more intelligent and conscientious electrician may not be found in the whole range of the scientific brotherhood, had attended the experiments and carefully examined the data on the spot. In the face of all the assertions made to the contrary by his countrymen, Professor Siemens has, in great measure, corroborated the accuracy of the report of these experiments made by M. Deprez to the French Academy of Sciences. This has proved a bitter pill to some of his English associates, and their dismal wails—if the English journals correctly report them—may be heard from Land's End to John O'Groat's.

The possibility of transmitting power electrically was so obvious long since that suggestions to that effect have frequently been made since the days of Volta by Ritchie, Jacobi, Henry, Page, Hjorth and others; but it has only been quite recently that such transmission has been rendered practically feasible.

Over six years ago Prof. Siemens, when delivering his presidential address to the Iron and Steel Institute, suggested that:

"Time will probably reveal to us effectual means of carrying power to great distances, but I cannot refrain from alluding to one which is, in my opinion, worthy of consideration, namely, the electrical conductor. Suppose water power to be employed to give motion to a dynamo electrical machine, a very powerful electrical current will be the result, which may be carried to great distance through a large metallic conductor, and then be made to impart motion to electromagnetic engines to ignite the carbon points of electric lamps, or to effect the separation of metals from their combinations. A copper rod 3" in diameter would be capable of transmitting 1,000 horse-power a distance of, say 30 miles, an amount sufficient to supply 250,000-candle power, which would suffice to illuminate a moderately-sized town."

Now, this suggestion of Prof. Siemens was much criticised at the time when it was still thought that electricity was incapable of being massed so as to deal with many horse-power of effect, and the size of conductor he proposed was also characterized as wholly inadequate.

Even Professor Siemens, an authority upon electrical matters then as now, was laughed at by the *soi-disant* scientists, who set him down as a dreamer. It would be interesting to test this early calculation by recent experience. Looking at M. Deprez's experiments from the most unfavorable standpoint, he succeeded in transmitting as much as three-horse power to a distance of forty kilometers (25 miles), through a pair of ordinary telegraph wires of four millimeters diameter. Taking the relative conductivity of iron wire employed by Deprez and the three-inch rod proposed by the lecturer, the amount of power that can be transmitted through the latter would be about 4,000-horse power. But Deprez employed a motor dynamo of 2,000-volts and was contented with a yield of 32 per cent. only of the power imparted to the primary machine, whereas he had calculated at the time upon an electromotive force of 200 volts and upon a return of at least 40 per cent. of the energy imparted.

Even at this rate, however, M. Deprez has virtually solved the problem. He left the beaten track where all were striving to accomplish the electrical transmission of power with large and costly copper conductors, and despite the incredulous looks of the doubting Thomases he reached the goal. When power is collected from running streams or waterfalls, the loss of 50, 60, or even 70 per cent. while *in transitu* would be of little consequence, and the 32 per cent. delivered at a distance of 10, 20, 30, or 40 miles, over an ordinary iron wire, as in Deprez's system, could be made to run shafting and to perform other valuable work.

## Electric Motors in Tunnels.

For obvious reasons, electricity is the best motive power for railways through tunnels, and if its use can be made economical, its introduction will be rapid. The Charing Cross & Waterloo Electric Railway Company has let a contract for the construction of a tunnel two-thirds of a mile long under the Thames River, between the Grand Hotel, near Charing Cross, and the loop-line station at Waterloo, the work to be completed within eighteen months The Messrs. Siemens have contracted to operate the railway for $25,000 a year and one-fifth of the gross receipts in excess of $100,000. It is estimated that at least one-eighth of the people who cross the Westminster, Charing Cross and Waterloo bridges will use the new tunnel, and with 12,000 passengers daily, one-third of them paying twopence and the others a penny each, a dividend of 18 per cent. annually can be paid on the company's capital, $400,000, which is the cost of the tunnel. The cars are to run separately, and the time between the Grand Hotel and the loop line at Waterloo is to be three and a half minutes, the rate of speed being about eleven miles an hour. The electric railway at the Paris Exhibition was profitable, but the fare was high and the novelty of the enterprise secured its patronage Until now no electric railway has been successful as a regular business investment. The Messrs. Siemens established their electric railway at Berlin as an advertisement, but they have taken the Charing Cross tunnel contract in a regular business way, and they have applied to Parliament for permission to establish five other electric railways. The success of the Charing Cross & Waterloo Railway will undoubtedly result in the introduction of electric motors in many tunnels. A second tunnel under the North River is proposed, and electricity will be needed to move the cars which run through many tunnels which are doubtless to be opened in the vicinity of New York.

The belief is prevalent that two tunnels might have been constructed under the East River with the money paid for the Brooklyn Bridge, and the use of electric motors in them would afford better means of transportation than the cars of the bridge. In this age of tunnels it is very desirable to have electricity accommodated to their service, and the London experiment certainly promises that result.

## An Underground Electric Railway.

The application of electricity to underground transit offers few of those objections which have been urged against the surface railroad. The charged rail system is, to a certain extent, objectionable because of its dangers to life and the great loss of electricity, caused by defective insulation from constant exposure to the elements. An underground railway would not be intersected by thoroughfares, and the roadway would be inaccessible to the public.

These are some of the reasons that have prompted a company of English capitalists to contemplate the building of an underground electric railway in London between the head of Northumberland avenue, opposite the Grand Hotel at Charing Cross, and the Waterloo station of the Southwestern Railway. The approach to the line at either end will be by a short flight of steps. The tunnel will be lined with white bricks and laid with steel rails upon continuous longitudinal sleepers of timber imbedded in a concrete floor.

It is almost unnecessary to refer to the many advantages which are likely to accrue from the use of electricity as a motive power. As the ordinary locomotives may be dispensed with, no steam or noxious vapors, the products of combustion, will exist in the tunnel. The carriages being run separately, and not subjected to the concussions and strains resulting from being united in a train drawn by an engine, will be very much lighter than the ordinary railway carriages. The weight of the engine will also be saved, so that the burden to be carried in addition to the paying load of the passengers themselves should not be much more than 40 per cent. of the whole weight of a loaded carriage.

Again, the rolling load being so light, the strain upon the permanent way will probably be greatly reduced, and traveling over it is likely to be much smoother and easier than on an ordinary railway. The passengers will suffer much less delay, being conveyed in carriages starting more frequently than would be practicable if the vehicles were grouped in trains.

Each carriage would be under the most perfect control, so as to be capable of being stopped with the same ease as an ordinary omnibus. There is no reason why the working should not be very economical in the light of recent experiments made both in this country and in England. The power will probably be derived from fixed compound engines working expansively with high-pressure steam.

As regards the feasibility of this scheme, we may observe that the electric system of locomotion was introduced by Dr. Werner Siemens, of Berlin, and has now been successfully worked, without any interruption, for nearly two years on a line at Lichtenfelde, near Berlin; also at the Zauckerode Collieries for mineral traffic. The largest application of the principle, however, has lately been effected in the North of Ireland, where Portrush and Bushmills are connected by means of an electric line, six miles in length, with gradients of 1 in 38. The details of the construction of the underground electric line, which is about to be constructed, will furnish interesting reading to the engineers soon to be employed in constructing the great arcade railway under Broadway. The absence of smoke and the odors attending the combustion of coal, of which the use of electricity is a guarantee, will be of inestimable importance; and the walls of the magnificent and costly buildings on both sides of Broadway, which, when the plan of an underground railway was first broached, were threatened with a permanent layer of soot, may remain unsullied and unsmirched.

The *Providence Journal* congratulates its city on doing, for its size, more "halloing" than any city in the world. There is a telephone subscriber to every 72 persons, while it is one to every 253 in Boston, to every 400 in New York, to every 471 in Paris and to every 2,563 in London.

# Electrical Notes.

Tariff books of the telegraph companies would prove to be remarkably fine geographical text-books for schools, as they certainly do already for the boys and men who handle them.

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The names of many towns and cities there met with have a tendency to make one stop and ask himself the question, How did it receive such a name? Is there a story connected therewith? A few of such are hereby noted.

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In Colorado, for instance, Barnums and Bailys are found side by side, and by taking a flying jump into Kansas—Hutchinson the remaining member of the firm may be discovered. Again, a trip may be taken to Paris, with none of the sufferings attending a sea voyage, and with a variety to choose from at that; thus, one will be found in Idaho, one in Illinois, one in Kentucky, one in Michigan, one in Missouri, one in Ontario, one in Tennessee, and one in Texas.

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If it is not enough to have the leading European city beckoning to us from almost every direction in which we can turn, the attraction is still further increased by meeting with Bismarck, in Dakota; also in Illinois and in Missouri; likewise in Ontario. If attractions of a dramatic kind are looked for, Romeo and Joliet may be found in Michigan and Illinois, while Hamlet can be witnessed in Indiana and North Carolina.

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There is a Baker's Store in Ohio, and a Big Run in the same, which would certainly be an undesirable state of affairs, were it not for the fact that Tranquility is also found therein.

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In Pennsylvania they have got Apollo and a Big Shanty. There also you will meet with a Fairchance, and, as a matter of course, Industry

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They have Forks, but no knives or spoons. To make amends for this deficiency, however, they present us with Mann's Choice and a Nicetown.

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Henry is wandering by himself away down in Tennessee, while Big Sandy and Melissa are anchored in Texas. In passing through West Virginia a Hurricane is encountered, after which we will stop for the present at Arcadia and Withee in Wisconsin.

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In days gone past, when the district messenger service was in the confidence of the public, and the bright and trusty messengers were all that they professed to be, certain convivially inclined parties were in the habit of making arrangements beforehand, that when they reached a certain stage one of the bright and trusty should accompany them in their further wanderings, and eventually guide them safely to their homes. This was a very good plan for the convivial gentlemen, no doubt. The effect, however, in the other direction does not appear to have been quite so satisfactory, and the order of things is now reversed.

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It generally requires two or three of the wide awake public to keep an eye on the bright and trusty.

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When that latter party doffs his uniform, he does not, strictly speaking, tend to inspire confidence.

There is a reason for this, which is not hard to find. Bad management has had much to do with it.

A man who is incapable of controlling his own passions is hardly the best kind of individual to put in charge of boys, or, in fact, of men either. They don't receive much justice, under such circumstances in their treatment. The language they hear, and which they soon begin to use, is not to their advantage, and the examples set them naturally bring about the results already reached.

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The bright and trusty boys, therefore, it may be truly said, have been long since banished from the service.

There are still a few left, but they are a few.

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The Ems and the Eider steamships of the North German Lloyd's running to New York, are about to be lighted with incandescent lamps.

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The depot of the French railway at Barcelona is about to be lighted with twenty-four arc lamps. At Yvaeskylae, in Northern Russia, Johnson's saw-mill is lighted with forty Edison lamps, with a dynamo machine of the type E.

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The Russian Government has just bought from the Swan Electric Light Company, for the price of $500,000, the exclusive right to use the inventions of that company in Russia, as well as the right to sell the lamps in that country.

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Besides the Kremlin, the City Hall of Moscow is to be illuminated by electricity on the occasion of the Czar's coronation, as well as the Place Rouge and Place Sokolnikifaree.

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The cable railroad on Vesuvius, which serves for the transport of tourists from Naples to the crater of the volcano, is lighted every night by Siemens & Halske electric lights.

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During the International Exhibition of Electricity in Vienna, the Vienna Privat-Telegraphen-Gesellschaft will establish telephonic communication between the Grand Opera and the Rotunda, so as to allow visitors to the exhibition to listen to the representations at the opera. In the China seas, between Hong Kong & Shanghai, the steamer Scotia is about to lay an electric cable of 965 miles.

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According to a report read on March 22d at the *Société Générale des Telephones*, the value of the telephone system of Paris consists of 2,309 lines in service with all the necessary apparatus and equipments, divided up among the central offices, and including a total development of 2,261 miles, including the trunk lines between the different central offices. The value of the provincial systems amounts to 1,184 lines in service, with a total development of 444 miles, and with 8 central offices, of which 2 are in Lyons. Besides other factories and depots the company has in Paris a central manufactory, devoted specially to the construction of telephones and electrical apparatus.

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In Switzerland a telephone line is projected between Zug and Zurich, following the left bank of Lake Zurich. The distance between the two cities is about 17 miles.

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The *Société Metallurgique Cockerill* of Seraing, near Liege, in Belgium, is about to attempt to connect by telephone its factory with the dock-yards for maritime construction which it has established at Hobocken, near Antwerp. It is about 344 miles from Seraing to Hobocken.

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In Brazil the first telephone concession was accorded in 1879 to Mr. A. Graham Bell, and in the year following, the capital of that empire, Rio Janeiro.

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The Lighthouse Board will purchase a first-order lens for an electric light, and will institute a series of experiments with a view of determining the value of the various kinds of electric light for lighthouse purposes. A first-class lighthouse will be built at Mosquito Inlet, Florida, and third-class lighthouses at Sanibel Island and Cape San Blas, Florida.

## Our Mexican Letter, No. 4.

MEXICO CITY, E. U. M., April 15, 1883.

GEORGE WORTHINGTON, ESQ.,

*Editor Electrical Review* N. Y.

DEAR SIR,—At the "Hotel del Bazar," where we have rooms temporarily, we live in Holy Ghost Street (Calle de Espiritu Santo), and our servant's name is Jesus—a combination of names that might well startle a reverential American. In the vernacular, however, the combination loses its startling character, and the pronunciation of the latter name (Hay-soos) is not suggestive.

Some day a bright American will come to Mexico City and open a bright American hotel, and retire from business in three years with a fortune. Rumors of the opening of such a hotel are frequent, but "the wish," I imagine, "is father to the thought." Speaking in general, and exaggerating very slightly, all the rooms at all the hotels are always full. Dwelling houses to let are "as rare as strawberries in the sea," and eligible business offices untenanted not more plentiful than "red herrings in the wood." The immense immigration compels the improvement of the suburbs; new buildings are constantly being erected, and rents rapidly rising. I know of a case where a thousand dollars was paid as bonus to a retail cigar dealer for his unexpired lease, which had but ten months to run. A feature in renting houses in this country is the fact that a tenant without a lease may give up the house when he desires, but cannot be dispossessed by his landlord (against the tenant's will) within three years.

The railroads—the Mexican Central in particular—are extending both from the north towards this city, and from here towards the north so rapidly that travelers to "the States" from Mexican cities are beginning to make the trip overland. A late instance is the departure by that route to-day of our well-known countrymen, the Hon Warner Miller, the Hon. J. W. Wadsworth, Gen. Anson G. McCook, and the Hon. Amos Townsend. These gentlemen made hosts of friends in their short stay with us. Last Friday evening Mrs. Morgan, wife of the American Minister, gave a most brilliant and enjoyable entertainment in their honor.

A new and favorable concession has been granted to the Mexican Central Railroad. The six per cent. subsidy has been increased to eight, the discount on Government freight and passengers reduced, and the company authorized to increase its tariff. These are among the privileges conceded, and are made public to-day for the first time. The Government also agrees to celebrate as a national event the arrival of the first through train.

The city of Mexico, considered telephonically, is rapidly increasing in importance. Its numerous Government offices, its surrounding haciendas, the custom of its business people of remaining at home during the hours from twelve noon to three P. M., its growing suburban districts, and the use of the telephone by ladies at their homes who rarely are seen on the streets, all tend to this increase. Trunk lines to numerous adjacent cities are demanded. Perhaps the most important of these is the line connecting Puebla with Mexico; it is building; the half of the line from Puebla towards Mexico—under charge of Vice-President Huntington of the Puebla Company—being just completed, and will speedily be connected.

The Mexican Telephone Company has recently been granted by the Ayuntamiento a new nine years' additional concession or permit extending its rights in relation to pole lines, and the work progresses very favorably.

The arrival here of President F. M. Delano of New York, with Major Geo. W. LaRue, of the Delano Haines Company of Mexico, is expected on the 24th inst.

One of the best known of our Mexican Americans is Mr. Thos. C. Purdy, formerly General Manager of the Mutual Union Telegraph Company, and now Vice-President of the Mexican National Railroad.

Mr. E. B. Mayo, late General Superintendent of the Mexican Telegraph Company—the cable company—resigned April 1, to go into commercial business as a partner in the house of Ritter & Co., of Vera Cruz. Mr. Mayo's popularity in this city was unbounded.

Although in the dry season, we have had recent rains enough to bring out in full beauty the wonderful profusion of Mexican flowers. "No family should be without them," and no family here need be, for we buy for "a real and a medio" (18 cents) two cubic feet of cut flowers—double violets, roses, double geraniums, orange blossoms, double pinks, arbutelons, and a thousand others.

The following named Americans started last month to Oaxaca—the capital city of the State of Oaxaca, of which ex-President Porfirio Diaz is Governor—to open the telephone exchange there, viz.: A. G. Haines, General Manager; G. C. Paine, Chas. Solomon, and L. S. Dubois, with Señor Yanniz as interpreter. The telephone was almost unknown in that State, and the party were confident of success. Mr. J. A. Bodwell, temporarily manager at Guadalajara, has been located as manager at Zacatecas. Mr. D. J. Hobart, one of the ablest telephonists in Mexico, has been made General Manager of the Guadalajara Company (controlling the State of Jalisco), and assumed charge this month.

I heard to-day of a novelty in ground wires. The manager of the exchange at Guanajuato discovered it attached to a large stone on a hill-top at some distance from the instrument, and complained. But the culprit explained that when the wire was run—in the rainy season—that hill-top was the bed of a river. Fact. Harry Gorham, at Leon, reports that he followed up a string leading from the office end of an acoustic telephone line, and found it neatly and carefully grounded on a copper plate in a deep well. They told him it was to protect the telephone from lightning. A lightning rod in Lagos runs half-way down toward the water in a well. It is kept carefully away from the sides of the well, and protected at the top by a shed built over the well for that purpose. The electrician who did it said he feared the wire might get wet and rust.

In New York, last year, Mr. Chinnock, electrician of the Metropolitan Company, sent a new man on trial to Manager Cochrane at the Murray Street office. He didn't suit, and when Mr. C. inquired, "What's the matter; don't the man know anything?" Mr. Cochrane answered in righteous indignation, "*Know* anything! he don't even *suspect* anything!" And they slew him. If you were here, you would know how to apply this; but there are first-class Mexican electricians and operators, though they are not so numerous, proportionately, as in the States.

One of the best of Mexican electricians, whose ability is the result of years of study, test, and experiment, is now visiting your prominent cities to examine into new and improved methods in telegraphy and electrics. This is Señor Don Saturnino Yslas. He is a member of the Royal Academy of Electricians and Engineers, and of the Mexican Telegraph Commission, and is the gentleman who put into use the first duplex ever practically worked in this republic. He speaks English well, and I am sure will receive in America the same cordial welcome that he has always given to Americans here.

The writer has recently received letters from General Manager L. E. Allen, of the Mexican Pacific Telephone Company, and from General Manager J. J. Ghegan, of the Mexican Northern Company. These gentlemen were well and happy. Mr. Horace O. Watts, brother of Mr. Harry Watts, of the firm of Davis & Watts, of Baltimore, arrived on the last steamer from New York, and is connected with the Mexican Telephone Company in this city.

The Wells Fargo Express Company began business here April 1 on the Mexican Central Railroad from this city north to Lagos, 475 kilometers. On the northern portion of this road, from Paso del Norte south to Chihuahua, they have long been in operation. Their representatives in this city, Messrs. Heron & Langtry, are deservedly popular.

The interest in mining properties in this country continues. States from which little has been heard in late years as regards min-

ing interests, such as Oaxaca and Guerrera, are developing handsomely, and numerous "bonanzas" continue to keep up the interest in the old-time districts of Pachuca, Guanajuato, Zacatecas, and San Luis Potosi.

In Guanajuato last month the writer went into the "Sereno" mine by tunnel and shaft 5,217 feet—say one mile. In the lower levels the water was hot, mining tools hot, and clothing almost unbearable to visitors; the miners wore none. This mine has a good past record, and much is expected of its future.

Electric light contracts pending or just executed for ten towers and the general lighting of the city of Mexico will, when carried out, make this city one of the most electrically lighted cities in the world. The Brush light is used.

The Edison incandescent light has just been put in the residence here of General Pacheco, Minister of Public Works. I have not yet seen it, but am told that it is a success. The house of ex-President Diaz, near to the other, will next be lighted by this system, for the introduction of which in Mexico a strong company has been organized. Mr. Nathan D. Crowell and Dr. Ward have charge of the practical work.

The German Club races began on Sunday April 1. The Jockey Club races begin next Sunday.

We have in the City of Mexico two steam laundries—the only ones in the republic.

Orrin Bros., of the Circo Metropolitano, and Fletcher, the professional skater, have opened a skating rink here. Its success is phenomenal.

Congress re-assembled on Sunday, April 1, with great pomp. President Gonzalez delivered his message, which is considered a most able and important one.

The Defossez French Opera Company, with such artists as Mlles. Fouquet and Hasselmans, Mad. Bernadi, Gabriel Tournié, tenor; the baritone Delrat, and the basso Jourdan, are in the midst of a successful season in this city. The wife of Mr. Defossez is of the New York Livingstones, and niece of the Hon. Galusha Grow, ex-Speaker of the House of Representatives.

Captain Eads has submitted to the Department of Public Works here his plans for the Tehuantepec ship canal.

General Diaz and suite are expected to arrive this week, returning from the United States.

Your ELECTRICAL REVIEW, in its new dress and re-christened, is just what it should be. How proud we would have been of such a weekly ten—or five—years ago, but now we seem to take such enterprise for granted.

I quote you, in closing, two little scraps that have attracted my attention; one by Chaucer, the other evidently by some old bachelor whose "settled girl" had treated him badly. Chaucer says:

"What is better than Gold? Jasper."
"What is better than Jasper? Wisdom."
"What is better than Wisdom? Woman."
"What is better than Woman? *Nothing*."

And the other is:

"What is lighter than a feather?"
"The dust that blows in summer weather."
"What's lighter than the dust, I pray?"
"The wind that blows the dust away."
"And what is lighter than the wind?"
"The lightness of a woman's mind."
"And what is lighter than that last?"
"Ah, there, my friend, you have me fast."

I am your friend, G. L. W.

### A New Use for Electricity.

A new cure has been discovered for balking and cribbing horses by the application of electricity.

A gentleman of Baltimore County, Maryland, who has a horse subject to balking, placed an electric battery, with an induction coil, in his buggy, and ran the wires to the horse's bit and crupper, and as soon as the horse came to a standstill the current was turned on, and after the horse was relieved of his shock he proceeded without showing any disposition whatever to balk. The same application was successfully made to a horse which indulged in cribbing, whereof he was soon cured through the unpleasantness of the electric shock.

### The Wonderful Progress of Electrical Science.

Some very interesting and suggestive facts are stated by E. M. Bently, one of the examiners in the electrical division of the patent office, regarding the wonderful progress of electrical science in the past few years. About 2,000 applications for patents on electrical inventions were filed in 1882, of which about two-thirds were granted.

In 1867 electricity was a sub-class in a division; now it is the largest and most important division in the Patent office. This astonishing growth is due chiefly to two causes:

1. The invention of the telephone.
2. The development of the magneto-electrical machine.

The former has stimulated invention of improvements and collateral appliances, and the latter has afforded a cheap and convenient source of electricity.

Immediately following the discoveries of Faraday and others, from 1830 to 1840, there was a widespread effort to make practical use of them, and special activity was manifested in the line of electric lighting. The arc light was put into practical form and the foundations of incandescent lighting were laid. But no economic source of electricity was at hand; for the galvanic battery consumed too much zinc for profit.

The principle of the magneto-electric machine had, indeed, been long known; but it was left for the Italian (Pacinotti) in 1850 to perfect a machine wherein continuous and constant currents were generated. The idea lay on the shelf, however, until 1870, when Gramme reinvented practically the same machine and pushed it into notice. He was speedily followed by the Siemens brothers, of Berlin, and Mr. Brush and others in the United States.

The magneto-electric machine, affording a cheap and abundant supply of electricity, immediately rendered practical all the half-completed inventions of thirty years, and opened the way to many new ones. Brush got his patent in 1877, Weston soon after, and many other inventors have made new applications of the marvelous force.

### National Railway Exposition Items.

Several papers, both in the East and West, have erroneously published March 24 as the opening day of the National Exposition of Railway Appliances.

The right date is May 24, and newspapers throughout the country are requested to aid in correcting this error by calling attention to it. Already a number of persons have taken long journeys to Chicago, expecting to be present at the opening, and in several places excursions have been permanently organized as a consequence.

Everything will be in readiness on May 24 for the opening of this, the most unique, interesting and (except the Centennial) the largest exposition ever held on this continent. But to have everything in place on that day will tax the energies of the Executive Committee to the utmost.

Some weeks since it was decided to make such additions to the Interstate Exposition Building as would increase its floor capacity about 200,000 feet. And now the plans have been changed still further to increase this amount by 100,000 feet, making an addition of 300,000 feet in all. This immense extension is found to be absolutely necessary to accommodate the exhibitors who have already applied for space.

The enterprise has become colossal, and it will be by far the most significant, attractive and largely-attended attraction of the coming summer.

Dr. Bigelow, of Boston, has won the highest of the Argenteuil prizes ($1,200) for a medical treatise sent to the Paris Academy of Medicine.

The Western Union Telegraph Company has closed all the offices of the Mutual Union Company in this city above Canal street. The offices below that street, including the head office at 135 Broadway, will be retained. Messages sent over the Mutual Union lines for delivery at points above Canal street will be forwarded by the Western Union. The Mutual Union offices in small towns where the Western Union has an office will be abandoned, but will be retained in the principal cities reached by the system.

In an article published by Dr. R. Doch it is asserted that the only substances worthy of the name of disinfectants are chlorine, bromine, iodine, mercury chloride, and perhaps potassium, permanganate and osmic acid. It has been found that spores of the bacillus of splenic fever kept for many days in a 5 per cent. zinc chloride solution develop when placed in suitable nutritive liquids, and even when added to serum containing ½ per cent. zinc chloride. The author expresses wonder how this salt should ever have been seriously regarded by respectable chemists as an antiseptic.

A company, organized under the laws of the State of New Jersey, has been formed by the consolidation of the Colombia and Venezuela Telephone Company and the Central American T. & T. Company. The company purchases its instruments outright from the Tropical American Telephone Company at a nominal price. An exchange has already been established at Caracas, and others will soon be opened at some of the other principal cities in Venezuela. The officers of the company are Mr. Henry S. Russell, president; Mr. Chas. Williams, Jr., vice-president; and Mr. Jas. H. Howard, secretary and treasurer.

The executive officers of this company are now in Boston. Mr. H. S. Russell is president of the company, Mr. J. H. Howard vice-president, and Mr. Charles W. Jones secretary and treasurer. The company has exchanges in operation at Barbadoes and in other of the West India Islands. The company also supplies telephones to nine other different telephone companies now organized and doing business.

Mr. Stroh, during a discussion at the last meeting of the Society of Telegraph Engineers, described a highly ingenious experiment with the microphone, from which he deduced that "during the time when the carbons are really in what is called microphonic contact, they are not in contact at all, or, all events, that there is a repellent action at the point of contact." In the experimental apparatus one small rod of carbon was attached at one end to an almost frictionless oscillating rod, having on its opposite side an extremely light concave reflector. The other end of this carbon rod fell across another carbon rod, which was fixed. The displacement of a spot of light reflected by the mirror showed that the upper carbon was repelled through $\frac{1}{2500}$ part of a millimeter.

The stockholders of the Yale Lock Manufacturing Company of Stamford, Ct., have changed the name of the company to the Yale & Towne Manufacturing Company. This change in name has become desirable by reason of the greatly enlarged scope of the company's business, in which the manufacture of locks is now but one of several large departments. The ownership and management remain unchanged. The company is manufacturing all kinds of hoisting machinery, including cranes of the largest sizes, and during the past year has begun the manufacture of the "Emery" testing machines. All kinds of scales and pressure gauges are also to be made by the Yale & Towne Manufacturing Company, which, under its new name, cannot fail to continue its enviable career of prosperity, due to good management and good workmanship.

### Reduction of Mutual Union Stock.

A little more than 93,000 shares of the stock of the Mutual Union Telegraph Company was represented at the stockholders' meeting, held Saturday last, for the purpose of reducing the capital stock from $10,000,000 to $2,500,000. By a unanimous vote the property and franchises of the Mutual Union Telegraph Company, subject to the mortgage and Western Union lease, were conveyed to "The New York Mutual Telegraph Company." The latter company issues its entire capital stock, of the par value of $2,500,000, divided into 100,000 shares of $25 each. This arrangement results in putting the new corporation, in all respects, in the place of the Mutual Union Telegraph Company, and giving the stockholders of the latter a proportionate interest in the former. The reduction of the capital stock will increase the rate of interest guaranteed thereon by the Western Union Company from 1½ per cent. to 6 per cent. per annum.

### Prices of Telephones.

The manager of the telephone company furnishes a list of the rates charged at 205 telephone exchanges in places of from 10,000 to 50,000 inhabitants in this country, from which the following table of rates is prepared:

| Rate at House. | No. Exchanges. | Rate Place of Business. | No. Exchanges. |
|---|---|---|---|
| $2 50 | 35 | $2.75 | 1 |
| 2.75 | 1 | 3.00 | 17 |
| 2.90 | 1 | 3 25 | 1 |
| 3.00 | 74 | 3.33 | 25 |
| 3.33 | 14 | 3.50 | 6 |
| 4.00 | 24 | 3.75 | 2 |
| 4.16 | 22 | 4.00 | 58 |
| 4.17 | 9 | 4.15 | 1 |
| 4.50 | 2 | 4.16 | 5 |
| 5.00 | 3 | 4.17 | 14 |
| 6.00 | 8 | | |
| 8.00 | 8 | 4.25 | 9 |
| | | 4.50 | 2 |
| | | 4.75 | 1 |
| | | 5.00 | 41 |
| | | 6.00 | 1 |
| | | 7.50 | 1 |
| | | 8.00 | 8 |
| | | 10.00 | 8 |
| | 201 | | 201 |

The Southern New England has twenty-one of these exchanges, with rates of $2.50 at private houses and $3.33 at places of business, which, as a glance at the table shows, makes its rates bear a favorable comparison with the average of the list.

### New Books.

*Chordal's Letters.*—John Wiley & Sons, 15 Astor Place, New York, have now ready a new and enlarged edition, with six additional plates, of Chordal's Letters, comprising the choicest selections from the series of articles entitled "Extracts from Chordal's Letters," which have appeared in the columns of the AMERICAN MACHINIST; with a steel portrait of the author, and upwards of fifty original illustrations by Charles J. Taylor. One volume, 12 mo. of nearly 400 pages; cloth, $2.

*The Possibility of Not Dying.*—By Hyland C. Kirk 1 vol. 12 mo., 75 cents. Published by G. P. Putnam's Sons, 27 West 23d street, New York.

It is a suggestive and valuable production, and will help to solve many modern theories.

*A Practical Treatise on Lightning Conductors.*—By Henry W. Spang, with illustrations. Published by Claxton, Remsen & Haffelfinger, 624 Market street, Philadelphia, Pa.

It is not uncommon to meet in our streets peddlers of kerosene going from house to house vending their illuminating fluid from a can. In Paris the electric stored light is carried about the streets like kerosene here, and it is said to have become a favorite way of illuminating houses on social and official occasions. The accumulators are carried in a vehicle, which is stationed in front of the house, and electric wires are conducted into the building through the windows. Incandescent lamps are placed in the ordinary candelabras, and the fitting of the most complex lighting is an affair of but a very short time.

We notice that Mr. Frank L. Freeman, late examiner in charge of the Electrical Department of the U. S. Patent Office, has resigned and opened an office as Solicitor of Patents and Counselor in patent causes. Mr. Freeman has associated with him in his new undertaking Mr. Charles E. Foster, a well-known mechanical and electrical expert of Washington. We think Mr. Freeman is very wise to leave the Government service and establish a business for himself, and with his long experience, extensive acquaintance, and acknowledged ability, their success in this field (where there is such a growing demand for expert talent) would seem assured.

We would observe in this connection that electrical companies and inventors who are needing the services of solicitors and experts would be served much more efficiently and satisfactorily in every respect if they would patronize well-known firms or individuals, rather than dealing with these so-called electrical agencies or patents agencies, under cover of which incompetent persons advertise for such business.

Mr. Freeman took charge of the class of electricity about three years ago, at which time it was but a sub-class in a sub-class in the "Philosophical Class." Now, besides being the largest class in the office, and employing the largest force of clerks, it has been pruned of some of the more general applications, as those relating to gas-lighting, separators, etc., and some of the special appliances, as therapeutics.

Up to July, '81, there had been about 4,000 patents granted relating more or less to the subject of electricity. Since that time, less than two years, there has been more than that number of applications filed, and the number is increasing every month.

Under the direction of the Commissioner of Patents, he compiled an index of all patents relating to electricity granted prior to July, 1882, giving the name, number and date of each in alphabetical, numerical and classified lists. This is published by the Government.

The specifications of all these patents were printed and bound, forming twenty-one volumes as large as the Revised Statutes. These were taken to the Paris Electrical Exhibition as an exhibit, to which exhibition he was sent as U. S. Commissioner, and where he served on the jury. He has been in the Patent Office about ten years, was appointed and promoted under the civil service rules, having been in charge of the class of printing paper manufactures, etc, prior to taking charge of electricity.

It is one of the marvels of the hour that the Washington Gaslight company should insist upon selling as gas a product that would bring so much more money if made into dark lanterns, car springs, black paint, coal hods, water-proof coats, and ink. Had it been devoted to these uses, to-day's divide of surplus might have been twice as large.—*National Republican.*

The Western Union Telegraph Company filed a bill in the Federal Court in Chicago yesterday to enjoin the city authorities from servering the wires and removing the poles of the Company under an ordinance which enters into effect to-day, and thus avert action similar to that taken against the Mutual Union Telegraph Company two months ago.

An amateur poetess anxiously wails, "Oh, where can I find rest!" Get a position as saleswoman in a store that doesn't advertise, darling.

A new electric lighthouse, designed to give greater security upon the Calvados coast, and at the mouth of the Seine, is about to be erected at Point-du-Castel, near St. Aubin-sur-Mer. It will have a height of 60 meters—197 feet.

At the instance of the Minister of Posts and Telegraphs the President of the French Republic, by a decree dated April 12, has promoted M. Deprez to the grade of officer in the Legion of Honor.

The gas company will begin to distribute its surplus fund to-day. The checks will be made payable during daylight hours on account of the danger, or rather the impossibility of counting money by the light of the gas company's gas.

## NEW PATENTS—ELECTRICAL—1883.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING APRIL 10, 1883.

275,611 Adjustable support for telephonic transmitters; William H. Eckert, John A. Seely and Edward A. Eckert, Cincinnati, O.

275,399 Conduit for electrical wires; John F. Martin, Chicago.

275,749 Connection for electric light fixtures; Sigmund Bergmann, New York.

275,392 Dynamo-electric machine; Vincent E. Keegan, Boston.

275,549 Dynamo-electric machine; Chas. J. Van de Poele, Chicago, Ill.

275,325 Electric arc lamp; Joseph B. Allen, Springfield, Ill.

275,407 Electric cable; William J. Phillips and George L. Kitson, Philadelphia, Pa.

275,424 Electric cable; Sidney F. Shelbourne, New York.

275,510 Electric arc light; George J. Murdoch, Binghamton, N. Y.

275,600 Electric signaling apparatus; Charles Cummings, Virginia City, Nev.

275,347 Frictional electrical machine; Philip Atkinson, Chicago.

275,748 Flexible electrical conductor; Sigmund Bergmann, New York.

275,420 Headgear for switchmen's telephones; Charles E. Scribner, Chicago, Ill.

275,422 Insulating compound for electric conductors; Sidney F. Shelbourne, New York.

275,613 Incandescing electric lamp; Thos. A. Edison, Menlo Park, N. J.

275,408 Machine for manufacturing electric cables; William J. Philips and George L. Kitson, Philadelphia, Pa.

275,423 Mold for insulating subterranean electric cables; Sidney F. Shelbourne, New York.

275,612 Manufacture of incandescing electric lamps; Thos. A. Edison, Menlo Park, N. J.

WEEK ENDING APRIL 17, 1883.

275,859 Apparatus for covering telegraph cables; John Roberson, Brooklyn, N. Y.

276,024 Cylinder for rotary armatures; James F. Gilliland, Indianapolis, Ind.

276,063 Dynamo electric machine; Wensel Moravа, Chicago, Ill

275,879 Electric signaling apparatus for railway trains; George M. Bedinger, Jr., Erlanger, Ky.

276,021 Electric pneumatic railway signals; Oscar Gassett, Boston, Mass.

276,038 Electric railway signals; Stephen C. Hendrickson, Brooklyn, N. Y.

276,136 Electric signaling apparatus for telephone lines; Daniel Drawbaugh, Eberly's Mill, Pa.

276,138 Electric interlocking switch and signal; Oscar Gassett and Israel Fisher, Boston, Mass.

275,797 Galvanic battery; William A. Alexander, Mobile, Ala.

275,845 Galvanic battery; John B. Odell, Chicago, Ill.

276,133 Incandescent electric light; Thomas L. Clingham, Asheville, N. C.

275,842 Speed regulator and reversing device for electric motors; Eusebius J. Molera and John C. Cebrian, San Francisco, Cal.

275,985-6 Secondary battery; Charles F. Brush, Cleveland, O.

276,009 Storage or secondary battery; Charles J. Van Depoele, Chicago, Ill.

276,087 Telegraphic relay; Joseph P. Smithers, Brooklyn, N. Y.

276,137 Telephone transmitter; Daniel Drawbaugh, Eberly's Mills, Pa.

**A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.**

In the patent case of Starr and Peyton against Moses G Farmer for improvement in electric lighting, the Secretary of the Interior has affirmed the action of the Commissioner of Patents awarding priority of invention to Farmer. The Secretary holds that the applicant having sufficiently demonstrated, in the manner prescribed in the statute, by the specifications and drawings that he has completed the invention, and that it is capable of successful operation, he is not required to show further that he has actually reduced it to practice; that a failure to show in the drawings a conventional device for accomplishing a certain object is not fatal to a complete exposition of an invention where the specifications afford an adequate disclosure.

## Manufacturing News.

### New Machine Shops, Foundries, Hotels and Mills.

Rhode Island workmanship scores another victory abroad. A cable dispatch from London announces the fact that the distinction of driving the electric light machinery in the House of Commons has been conferred upon the Armington & Sims engine.

The French Admiralty are now having thirty-one vessels constructed in the Government dockyards and fifteen in private yards. Fourteen of them are ironclads, and are estimated to cost $25,000,000. The two principal ships, the Admiral Baudin and the Formidable, are to cost $2,200,000 each.

The electricity generated by the machinery in one of the great Harmony Mills at Cohoes, owing to peculiar conditions which are not perfectly understood, has of late so charged the atmosphere as to affect the employes unpleasantly. Various attempts were made without result to remove the nuisance, but at last a network of wires running through the mill has been successfully employed to collect the electricity and conduct it to the ground.

During the year ending December, 1882, the value of domestic and foreign merchandise exported from the United States amounted to $767,967,337; the imports of merchandise to $752,841,145. The excess of exports was but $15,126,192.

During the calendar year of 1882 the value of domestic and foreign merchandise exported by Great Britain was £307,304,156; the imports of merchandise, £412,001,683. The excess of imports was £104,697,527.

The foreign trade of France during the calendar year of 1882 was in imports to the value of 4,972,070,000 francs, in exports to the value of 3,596,164,000 francs. The excess of imports, 1,375,906,000.

The electric light appears also to have undoubtedly opened up a new field of industry, and anxiety for the gas companies—to keep themselves in the field.

Among new corporations are the Chicago Swedish Iron Company, capital $100,000; incorporators, Samuel A. Freeman, Charles H. Dulky, Charles Kern, and Victor G. Gowan. Joliet Spiral Barb Fence Company, capital $100,000; incorporators, Thomas J. Reily, Peter Adelmann, and Michael Fitzpatrick.

THE ELECTRICAL REVIEW is the title of a weekly journal of electric light, telephone, telegraph, and scientific progress, published by Delano & Co., New York, and edited by George Worthington. A valuable periodical in the interests above named.—*Evening Standard, New Bedford, Mass.*

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### Business Notices.

The attention of persons interested in local telegraph and telephone organizations is respectfully called to the electric lighting system of The Fuller Electrical Company, and the practicability of making arrangements with that company for the introduction of its apparatus, either in isolated plants, or through the formation of local companies desiring to engage in the business of electric lighting. The specially valuable feature of this company's system may be seen by examination of its apparatus in Boston, Worcester, Providence, Hartford, New York City, Brooklyn, Jersey City, Paterson, Philadelphia, Lancaster, Scranton, Syracuse, Rochester, Buffalo, Pittsburgh, Wheeling, Steubenville, Xenia, Dayton, Grand Rapids, Chicago, Springfield, Belleville, St. Louis, St. Paul, and many other smaller places throughout the country. Correspondence is invited.

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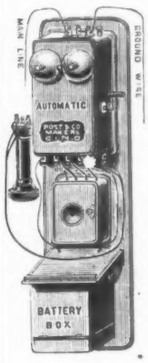


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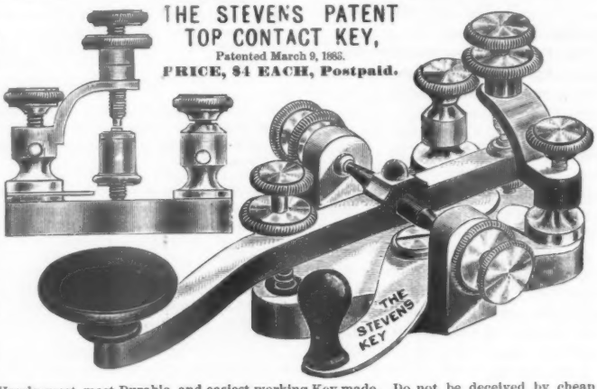


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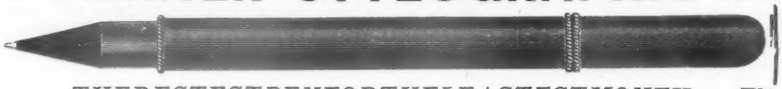

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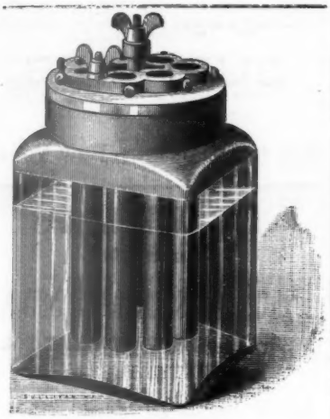

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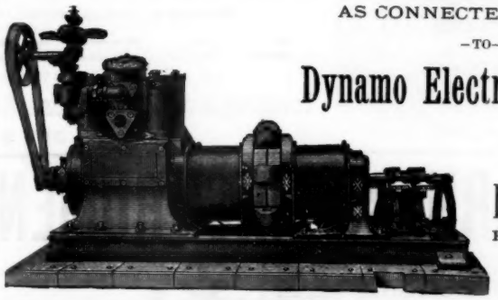

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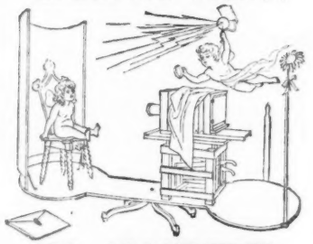

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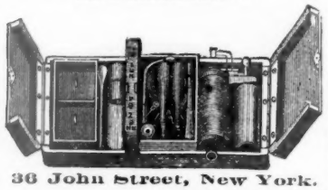

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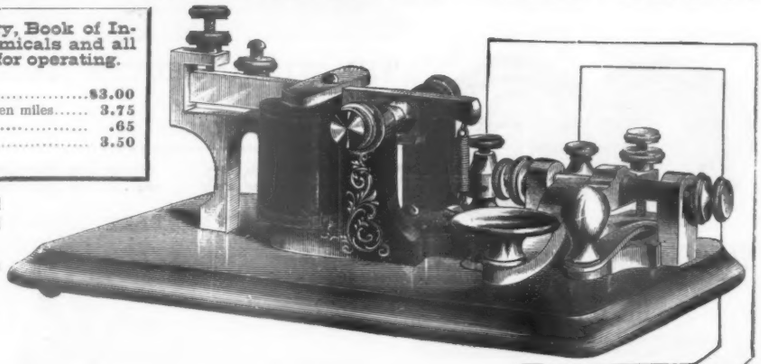

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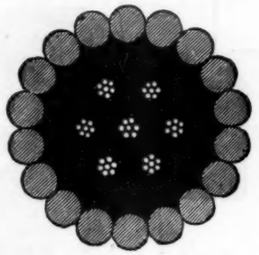

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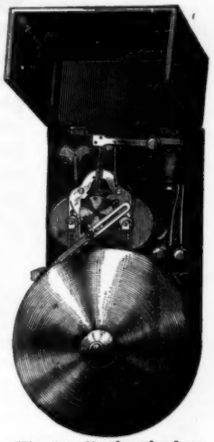

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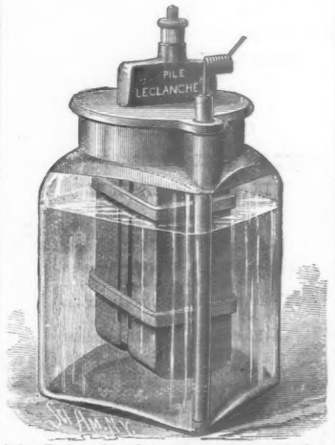


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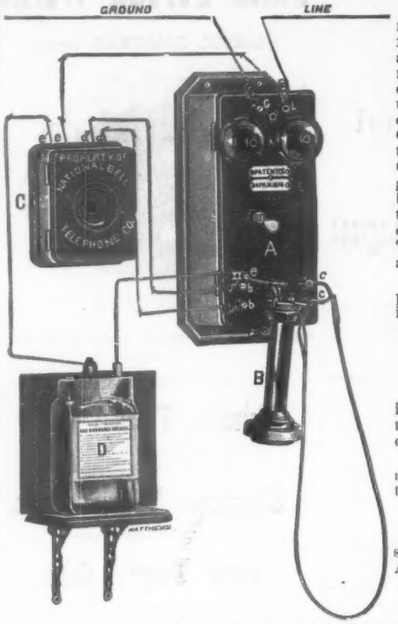


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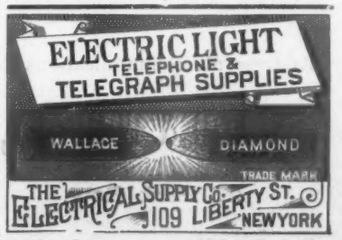
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